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ABSTRACT

This General Accounting Office (GAO) report examines the problems encountered by school food service programs in their efforts to meet the Department of Agriculture's nutrient requirements for school lunches while increasing student participation and reducing food waste and program costs. The report is based on an evaluation of two senior high school lunch programs in each of seven school districts representing a broad range of approaches to food services. Appendices include discussion of the results of nutrient analysis testing, sources of various nutrients, differences in nutritional content of lunches according to lunch format or location, and an overview of the menu planning and development, and the organization and management of food service divisions for the school districts reviewed. (JCD)

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BY THE COMPTROLLER GENERAL

Report To The Congress

OF THE UNITED STATES

Efforts To Improve School Lunch Programs--Are They Paying Off?

By setting specific food requirements, the Department of Agriculture tries to provide students with school lunches that, over time, contain one-third of the recommended dietary allowances (RDA s) of specific nutrients. However, GAO's tests of lunches from seven school districts which had adopted various innovative lunch programs showed that following these specified food requirements does not ensure achievement of Agriculture's nutrient goals. The conventional format came closer to the goals more often than the salad and fast-food formats, but all types of lunches fell short of providing the recommended levels of as many as 7 of the 14 nutrients tested--some to a serious extent.

Upgrading lunch nutrients may be difficult but, if Agriculture considers it important to have a specific RDA goal, steps must be taken to ensure achievement.

Food service officials believed that offering senior high school students a greater food selection and improving their eating environment increased lunch program participation. They also believed that greater food selection and allowing students to decline some food items decreased plate waste. School lunch program innovations do not necessarily increase the cost of providing a lunch.

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COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON D.C. 20548

B-204143

To the President of the Senate and the
Speaker of the House of Representatives

This report discusses the difficulty in meeting the Department of Agriculture's nutrient goals for school lunches even when meal portions served meet or exceed the requirements of the meal pattern. The report also discusses various methods some school districts are using to serve more nutritious school lunches as well as increase student participation and reduce food waste and program costs.

Copies of this report are being sent to the Secretary of Agriculture and the Director, Office of Management and Budget.

Milton J. Socolar
Acting Comptroller General
of the United States

UDO21842

COMPTROLLER GENERAL'S REPORT TO THE CONGRESS

EFFORTS TO IMPROVE SCHOOL LUNCH PROGRAMS--ARE THEY PAYING OFF?

D I G E S T

School food service programs across the Nation--especially in high schools--are having difficulty in effectively providing lunches to the Nation's children. Many programs are faced with increasing meal costs, declining student participation, plate waste (food served but not eaten), and unanswered questions about the nutrients in the meals. In fiscal year 1980 the Department of Agriculture provided over $3.5 billion in cash and donated commodities to help support these programs. GAO is recommending that Agriculture take a fresh look at its nutritional goal for the lunch program and either take steps to ensure that lunches meet the present goal or establish a more achievable one.

GAO reviewed seven school districts to determine if their "innovative" approaches were solving or aggravating problems in the lunch program. These innovative districts were Clark County, Nevada; Dade County, Florida; Fulton County, Georgia; Milwaukee, Wisconsin; New York City; San Diego, California; and South-Western City, Ohio. The information GAO obtained pertains only to the districts it reviewed and constitutes a case study approach that GAO believes provides important insights into the nature of lunch program problems.

HIGH SCHOOL LUNCHES DO NOT MEET NUTRITIONAL GOALS

None of the high school lunch formats (conventional, fast food, or salad) in the seven districts met the program's goal of providing, over time, one-third of the students' recommended dietary allowances (RDAs) even though the lunches as offered, on the average, met or exceeded the amounts of food required in the Department of Agriculture's meal pattern.

The conventional format came closer to meeting the goal more often than the salad or fast-food formats, but all formats had problems providing the recommended levels of 7 of the 14 nutrients included in the analysis--folacin, vitamin B-6, iron, thiamin, magnesium, zinc, and vitamin C--some to a serious extent.

Because students also eat at other times of the day, there may be no health risk associated with these nutrient deficiencies. (See pp. 5 to 9.)

Upgrading the lunches' nutritional quality to meet all the goals may be difficult and may not be feasible in all cases because attempts to improve nutrition may adversely affect participation, cost, and plate waste. Nevertheless, if Agriculture believes that meeting a specified RDA goal is important, it needs to take steps to ensure that the goal is met without unacceptable impacts on plate waste, cost, and student participation. If not, Agriculture should make clear that there is no specified RDA goal and that school lunches may, in fact, not be providing the amount of nutrients previously assumed.

Agriculture is sponsoring a test of a computer assisted nutrient standard system of meal planning. In this system, menus are developed based on nutritional value of foods rather than the meal pattern. This is a promising approach to ensuring that an RDA nutritional goal will be met. (See pp. 11 and 12.)

The recently enacted Omnibus Budget Reconciliation Act of 1981 calls for the Secretary of Agriculture to review program regulations, including those pertaining to the meal pattern, and, if necessary, make changes to effect cost savings in program operations. This could have an important impact on the nutrient content of school lunches and on program goals. (See p. 13.)

INCREASED LUNCH CHOICES
BOOST STUDENT PARTICIPATION

Although many factors influence students' decisions to eat lunch at school, offering senior high school students a greater food selection and improving the eating environment seem to increase program participation. In three districts where GAO could compare participation before and after the districts increased food choices and/or made substantial changes in the eating environment of senior high schools, the rates of student participation in the lunch program increased from 7 to 18 percent. This increase came not only from students receiving free or reduced-price lunches but also from students paying full price. (See pp. 17 to 21.)

PLATE WASTE IN INNOVATIVE LUNCH PROGRAMS

GAO found that plate waste averaged about 13 percent in the conventional format and 9 percent in the fast-food format. Higher conventional-lunch plate waste generally resulted from higher percentages of waste for vegetables/fruits and bread items. Milk had the lowest rate of waste. Females wasted more food than males. Food service officials believed that the offer-versus-serve option (allowing students to refuse food items) and serving a variety of foods from which students may choose help reduce plate waste. (See pp. 22 to 26.)

INNOVATIVE LUNCH PROGRAMS NEED NOT INCREASE COSTS

Having fast-food and salad formats in addition to the conventional format in a lunch program does not necessarily increase costs. Lunch costs of the two or three formats offered in high schools were not consistently higher or lower than the average district lunch cost. School lunch costs in the school districts GAO reviewed continually increased from school years 1976-77 through 1979-80. These increases ranged from 9 to 38 cents. (See pp. 27 to 30.)

RECOMMENDATIONS TO THE SECRETARY OF AGRICULTURE

The Secretary should take a fresh look at Agriculture's one-third RDA goal for school lunches and decide whether:

1. The achievement of some specified goal--such as one-third RDA--within acceptable limits of plate waste, cost, and student participation is considered unnecessary or impractical, and therefore the goal should be dropped and the program should operate simply on the basis of providing a variety of foods within a specified meal pattern or some other achievable criteria.

2. The serving of lunches that will provide either one-third or some other specified percentage of the RDAs over time is considered important for students' nutritional well-being, and therefore ways must be developed to ensure that the goal is essentially met within acceptable limits of plate waste, cost, and student participation. This could involve

--requiring that different quantities of food be served to different age groups,

--specifying certain foods that must be served,

--expanding the menu planning guide to include lists of foods for nutrients not currently listed,

--providing guidance on how to incorporate certain hard-to-get nutrients into the lunches,

--providing guidance on minimizing loss of nutrients through preparation and storage, and/or

--implementing the computer assisted nutrient standard menu planning system nationwide after working with school districts currently testing the system to reduce the differences in expected and actual nutrient content of computer-planned meals.

Other ways to achieve an RDA goal should be explored within Agriculture and with school food authorities and recognized experts in nutrition and food service. (See pp. 14 and 15.)

AGENCY COMMENTS

Agriculture agreed that the nutritional goal of the meal pattern should be reexamined. It said that a task force is reviewing the meal pattern and will take GAO's recommendations into consideration as it proceeds. (See pp. 15 and 16.)

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ABBREVIATIONS

CANS	computer assisted nutrient standard
RDAs	recommended dietary allowances
USDA	U.S. Department of Agriculture

CHAPTER 1

INTRODUCTION

School food service programs across the Nation--especially high school programs--are having difficulty in effectively providing lunches to the Nation's schoolchildren. Many programs are faced with increasing meal costs, declining student participation, plate waste (food served but not eaten), and uncertainty about the nutritional content of the meals served. Because of these challenges, we reviewed various school districts across the Nation which have tried "innovative" approaches to improve their lunch programs.

OBJECTIVES, SCOPE, AND METHODOLOGY

We selected for review two senior high schools in each of seven school districts with a broad range of lunch programs.

1. Clark County School District, Nevada, has been a forerunner in offering lunches similar to those offered by fast-food restaurants--hot or cold sandwich, french fries or salad, and milk or a milkshake. The district also offered salad-bar lunches.

2. Dade County Public Schools, Florida, offered several food choices within a variety of lunch formats--conventional hot lunch, fast-food lunch, salad bar or preportioned chef salad, and a bag lunch. The district used the computer assisted nutrient standard (CANS) system of menu planning for its elementary schools.

3. Fulton County Schools, Georgia, offered conventional, fast-food, and salad-bar lunches with an emphasis on serving natural foods; eliminating refined sugar, food coloring, preservatives, and additives used in cooking; and reducing salt and animal fat.

4. Milwaukee Public Schools, Wisconsin, offered a conventional hot lunch with emphasis on the quality of food served and extensive student input into menu planning and food selection.

5. New York City, New York, developed the "Energy Factory" concept, combining marketing techniques with student involvement. Energy Factories offered students the foods they wanted in conventional, fast-food, and salad-bar formats in an eating environment designed around student committee input.

6. San Diego Unified School District, California, introduced new strategies to increase student participation. The district renamed the conventional lunch the "campus special" and introduced fast-food lunches. The district also used CANS menu planning for its elementary schools.

7. South-Western City School District, Ohio, changed from a self-operated program offering only a conventional lunch format to a food service management company-operated program with conventional and fast-food lunch formats.

Appendix III presents a more detailed description of each district's program. Appendix IV shows comparative statistical data.

We evaluated these lunch techniques to determine if any were solving or aggravating problems in the lunch program and to see what the U.S. Department of Agriculture's (USDA's) Food and Nutrition Service could do to help alleviate these problems.

To do this we evaluated the nutrient content of high school lunches, the extent of plate waste in conventional and fast-food lunch formats, the levels of student participation in high school lunch programs, and the costs of offering various lunch formats. Throughout our review we had extensive contact with USDA officials, especially in selecting sites and developing our lunch selection and analysis methods. We also reviewed pertinent laws and regulations and reviewed scientific literature on nutrients and recommended dietary allowances (RDAs). 1/ In determining the extent of problems and possible solutions, especially regarding participation, plate waste, and cost, we relied heavily on our discussions with USDA and local food service officials and medical and nutrition experts.

The information we obtained pertains to the districts we reviewed and constitutes a case study approach that we believe provides important insight into the nature of lunch program problems. Chapter 6 details the scope of our nutrient evaluation and describes the methodology used in selecting lunches and forwarding them for laboratory analysis of nutrient content. The scope, methodology, and any limitations on the results of our reviews of plate waste, student participation, and lunch costs are included in the respective chapters on these subjects.

LEGISLATIVE AUTHORIZATION

The school lunch program, authorized by the National School Lunch Act, as amended (42 U.S.C. 1751 et seq.), and the Child Nutrition Act of 1966, as amended (42 U.S.C. 1779), is designed to safeguard the health and well-being of the Nation's schoolchildren and to encourage the domestic consumption of nutritious agricultural commodities. USDA's Food and Nutrition Service, working through State agencies, administers the program in the

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1/RDAs, developed by the National Academy of Sciences-National Research Council, are the amounts of essential nutrients considered, on the basis of available scientific knowledge, adequate to meet the known nutritional needs of practically all healthy persons in the Nation. (See app. VII.)

50 States, the District of Columbia, Puerto Rico, Guam, the Virgin Islands, and the Northern Mariana Islands. In fiscal year 1980 about 95,000 schools participated in the program. During the peak month (October) of school year 1979-80, about 25 million students were served lunches daily.

Payments of Federal cash subsidies and donations of commodities amounted to over $3.5 billion in fiscal year 1980. (See app. VI.) These are based on the number of lunches served which conform to standards prescribed by the Secretary of Agriculture. Section 4 of the National School Lunch Act authorizes general cash assistance to participating school districts for a portion of the costs of lunches served to school children, regardless of their families' incomes. Section 11 of the act authorizes additional, special cash assistance for free and reduced-price lunches served to needy children. National average payment factors for the period January through September 1981 are 18.75 cents for all lunches served and an additional 83.5 cents for free lunches and 63.5 cents for reduced-price lunches. Commodity donations are based on the national Federal commodity assistance rate which currently is 13.5 cents per lunch served.

NUTRITIONAL GOALS AND REQUIREMENTS

The National School Lunch Act, as amended, requires that lunches offered by participating schools meet standards prescribed by the Secretary of Agriculture. The Secretary has determined that, as a goal, lunches should provide, over time, approximately one-third of the nutrients called for in the RDAs. (See app. VII.) To achieve this goal, USDA requires that lunches contain prescribed minimum quantities of various foods. These specified amounts are called the meal pattern.

During our review, the minimum lunch requirements were 2 ounces of meat or an equivalent amount of other protein-rich food, three-quarters of a cup of two or more fruits and/or vegetables, one serving of bread or bread alternate, and one-half pint of fluid milk. Because these amounts were based on the needs of 10- to 12-year-olds, USDA recommended larger portions (unspecified amounts) for older students.

In May 1980 USDA updated the meal pattern in part to incorporate the 1980 version of the RDAs. The revised regulations again include a recommendation (not a requirement) for larger servings for older students. However, this time they specified that these students should be served 3 ounces of meat or meat alternate daily and 10 slices of bread per week.

To help school districts plan and serve nutritious school meals, the Service publishes the Menu Planning Guide for School Food Service. The guide covers "the philosophy and principles of good menu planning; Federal requirements, recommendations and policies; methods of menu planning; and merchandising techniques for promoting good nutrition." The guidance provided includes recommendations on how to reduce fat, sugar, and salt in meals;

lists of nutrient-rich foods categorized by nutrient; and recommendations that foods rich in these nutrients be served several times a week.

CHAPTER 2

HIGH SCHOOL LUNCHES DO NOT MEET NUTRITIONAL GOALS

Although the three types of high school lunch formats tested--conventional, fast food, and salad--met or exceeded, on the average, USDA's required quantities of various types of food (the meal pattern), none of them met the program's goal of providing one-third of the RDAs for 15- to 18-year-old students. All lunch formats were not deficient in the same nutrients, but most districts' formats were deficient in at least 7 of the 14 nutrients included in our analysis--folacin, vitamin B-6, iron, thiamin, magnesium, zinc, and vitamin C. Some vitamin A deficiencies were also found, mainly in the fast-food format. The remaining six nutrients--protein, calcium, niacin, riboflavin, phosphorus, and iodine--were found in sufficient quantity in each format to meet or exceed the one-third RDA goal. In February 1978 we reported 1/ similar deficiencies for elementary school lunches in achieving nutrient goals.

Using a nutrient standard to plan menus is a possible alternative to the basic meal pattern for meeting the one-third RDA goal for school lunches. We discussed the use of such a standard in a January 1977 report. 2/ Although a computer assisted nutrient standard program has not been used to plan high school menus, the results of our nutrient testing of CANS elementary school lunches in San Diego indicated some potential for meeting nutrient goals. Although our analysis of CANS lunches showed that they failed to meet some of the nutrient goals for key nutrients specifically programed into the computer, the CANS lunches more closely approximated the nutrient goals over time than San Diego's secondary school lunch formats using the meal pattern.

Lunches could be nutrient deficient for a variety of reasons. The amounts and types of foods served plus preparation and storage techniques have an impact on the nutrient content of lunches. Upgrading the nutritional quality of lunches to meet all the goals may be difficult and perhaps may not be feasible. Nevertheless, steps should be taken to ensure that lunches served in the National School Lunch Program better achieve the program's goals. Efforts should be directed toward eliminating nutrient deficiencies, especially in the fast-food format.

NUTRIENT ANALYSIS OF LUNCHES

To determine if lunches from the seven selected school districts were meeting the goal of approximately one-third of the

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1/"How Good Are School Lunches?" (CED-78-22, Feb. 3, 1978).

2/"The Impact of Federal Commodity Donations on the School Lunch Program" (CED-77-32, Jan. 31, 1977).

RDAs for high school students, we had Raltech Scientific Services, Inc.--nationally recognized experts in nutrient testing--analyze lunch samples for nutrient content. We also had the laboratory weigh the lunch components and found that the high school lunches included amounts of various types of food that met or exceeded, on the average, USDA's required meal pattern. This report discusses in detail the results obtained from analyses for 14 of the 17 nutrients for which RDAs have been established. Because professional nutritionists believe that shortages of three nutrients--vitamins D, E, and B-12--were very unlikely, we did not test them. We also tested for four nutrients--calories, sodium, cholesterol, and total sugar--for which specific RDAs have not been established.

The laboratory test results were presented as a percentage of one-third of the 1980 RDAs for both males and females in the 15- to 18-year-old age group. In those instances where the National Academy of Sciences was unable to set a specific RDA, we compared the results to the "safe and adequate" ranges provided in the Academy's literature. We also selected and had lunches analyzed from one San Diego elementary school that served lunches prepared with CANS menu planning and had the results presented as a percentage of the 1980 RDAs for 7- to 10-year-old children.

Although it may be appropriate to set a goal of one-third of the RDAs as a reasonable approximation of what lunches should provide over time, there may be no health risk associated with not meeting the goal. Most food service and USDA officials interviewed believed that the goal was reasonable, especially for students from low income families who may rely on school lunch for a high percentage of their nutrition. Nevertheless, students do eat at other times of the day and the importance of lunch depends on what and how much they eat at those times. Further, the RDAs are expected to provide generous amounts of nutrients for most children; thus, even if the proportion of the allowances provided by lunch is low, there may be no cause for concern. The National Academy of Sciences states that the basis for the RDAs is such that "even if a person habitually consumes less than the recommended amounts of some nutrients, his diet is not necessarily inadequate for those nutrients."

Analysis of meal-pattern lunches

The seven school districts reviewed offered one or more of the following three lunch formats in their high schools.

1. Conventional--includes a basic meat item, two vegetables and/or fruits, a bread item, and milk. A typical conventional lunch might be salisbury steak, mashed potatoes with gravy, applesauce, a muffin, and milk.

2. Fast food--usually sandwich-type meals that often can be eaten without utensils. A typical fast-food lunch might be a cheeseburger on a bun with lettuce, pickle, and onion

along with french fries and a milkshake. In some locations, these lunches were supplemented with a fruit item.

3. Salad--a pre-plated chef salad or a salad prepared by a student from an array of lettuce, other vegetables, and protein items (usually preportioned) along with bread and a milk product. A typical salad lunch may contain cheese, turkey, ham, lettuce, tomatoes, green peppers, celery, carrots, fruit, salad dressing, bread, and milk.

Nutrients with specific RDAs

The following table shows the results of our nutrient testing. The data shows whether districts were providing one-third RDA over a week's time. (See ch. 6 for a detailed explanation of our methodology.) The conventional format came closer to meeting the nutritional goals for both males and females more often than either the salad or fast-food formats. All lunch formats came closer to meeting female nutritional goals than male nutritional goals because female RDA requirements were lower for some nutrients.

Number of Districts Meeting One-Third RDA Goal by Format

	Male			Female		
Nutrient	Conventional (note a)	Salad (note b)	Fast food (notes a and c)	Conventional (note a)	Salad (note b)	Fast food (notes a and c)
Protein	All 6	All 5	All 6	All 6	All 5	All 6
Calcium	All 6	All 5	All 6	All 6	All 5	All 6
Niacin	All 6	All 5	All 6	All 6	All 5	All 6
Riboflavin	All 6	All 5	All 6	All 6	All 5	All 6
Phosphorus	All 6	All 5	All 6	All 6	All 5	All 6
Iodine	All 6	All 5	All 6	All 6	All 5	All 6
Vitamin A	All 6	4 of 5	1 of 6	All 6	All 5	2 of 6
Vitamin C	4 of 6	3 of 5	2 of 6	4 of 6	3 of 5	2 of 6
Zinc	3 of 6	2 of 5	None	3 of 6	2 of 5	None
Magnesium	2 of 6	2 of 5	None	5 of 6	2 of 5	3 of 6
Thiamin	2 of 6	None	None	3 of 6	3 of 5	2 of 6
Iron	2 of 6	1 of 5	None	2 of 6	1 of 5	None
Vitamin B-6	1 of 6	None	1 of 6	1 of 6	None	1 of 6
Folacin	None	1 of 5	None	None	1 of 5	None

a/Six of seven districts we reviewed offered this format.

b/Five of seven districts we reviewed offered this format.

c/We also analyzed each fast-food meal individually and found that none met the goal for all nutrients.

All three lunch formats met the RDA goal for 6 of the 14 nutrients tested. For the remaining eight nutrients, the fast-food format was more often deficient than the conventional or salad format, particularly for vitamins A and C. Also, serious deficiencies were more prevalent in the fast-food format than in the other two, as shown in the following table. We use the term "seriously deficient" throughout this report to describe formats which provide less than 75 percent of the one-third RDA nutrient goal. 1/ (See app. II for a detailed discussion of each nutrient tested and charts showing testing results by school district and lunch format.)

Number of Districts with Serious Deficiencies by Format

	Male			Female		
Nutrient	Conventional (note a)	Salad (note b)	Fast food (note a)	Conventional (note a)	Salad (note b)	Fast food (note a)
Protein	None	None	None	None	None	None
Calcium	None	None	None	None	None	None
Niacin	None	None	None	None	None	None
Riboflavin	None	None	None	None	None	None
Phosphorus	None	None	None	None	None	None
Iodine	None	None	None	None	None	None
Vitamin A	None	None	4 of 6	None	None	2 of 6
Vitamin C	1 of 6	2 of 5	1 of 6	1 of 6	2 of 5	1 of 6
Zinc	None	2 of 5	2 of 6	None	2 of 5	2 of 6
Magnesium	1 of 6	3 of 5	3 of 6	None	None	None
Thiamin	3 of 6	2 of 5	3 of 6	1 of 6	None	None
Iron	2 of 6	3 of 5	4 of 6	2 of 6	3 of 5	4 of 6
Vitamin B-6	4 of 6	3 of 5	4 of 6	4 of 6	3 of 5	4 of 6
Folacin	4 of 6	3 of 5	5 of 6	4 of 6	3 of 5	5 of 6

a/Six of seven districts reviewed offered this format.

b/Five of seven districts reviewed offered this format.

Nutrients with no specific RDAs

For the four nutrients analyzed for which specific RDAs have not been established--calories, cholesterol, sodium, and total sugar--lunches in general provided the minimum amount of these nutrients generally recognized as necessary for good health. Of some concern is the fact that, although there is no scientific consensus on how much is too much, lunches may provide excessive

1/"Serious deficiencies" is used to show a large shortfall in making the one-third RDA goal; the term does not necessarily imply that a serious health risk is involved.

levels of all four of these nutrients. (See app. II for a detailed discussion of each nutrient tested and charts showing testing results by school district and lunch format.)

Analysis of computer assisted nutrient standard lunches

USDA sponsors two of the districts visited--San Diego and Dade County--in a test of computer-developed, nutrient-based menu planning. USDA provides portions of the data base, computer software, and technical assistance to these districts but no funds to operate the program other than the normal Federal reimbursement for meals served.

Under CANS, menus are designed specifying portion sizes that must be served to provide as closely as possible one-third of the RDAs on a daily basis for nine key nutrients. USDA estimated that by meeting the goal for these key nutrients, the meal should also provide one-third RDA for nutrients not specified in the computer program. CANS lunches are not required to meet the meal-pattern portion sizes although Dade County's computer is programed to meet both nutrient-standard and meal-pattern portion requirements.

Currently, CANS menus are designed to meet the needs of 9- to 11-year-old students. USDA developed this CANS standard by a weighted blending of the 1980 RDAs for the 7 to 10 and 11 to 14 age groupings for both males and females. No similar CANS standard has been developed or tested which would be applicable for high school students. San Diego has tried CANS on a very limited basis in some junior high schools and plans future senior high school testing.

We tested CANS lunches served over 1 week in a San Diego elementary school. We found that, although these lunches met more of the one-third RDA goal for the 14 nutrients analyzed than did San Diego's secondary school lunches prepared using the meal pattern, they also had problems meeting the one-third RDA goal. CANS lunches met RDA goals for 9 of the 14 nutrients tested, while secondary school fast-food and salad formats met RDA goals of 6 of the 14 and the conventional format met 7 for males and 8 for females. However, the CANS lunches failed to meet RDA goals of four of the nine key nutrients 1/ for which the computer was programed, even though the computer showed that the required nutrients would be present. The lunches were seriously deficient in thiamin and deficient to a lesser degree in iron, calories, and vitamin C.

1/These key nutrients are calories, protein, calcium, iron, vitamin A, thiamin, riboflavin, niacin, and vitamin C. CANS also includes fat as a nutrient but no RDA standard is available.

CONSIDERATIONS FOR IMPROVING NUTRIENT CONTENT OF LUNCHES

Meal-pattern lunches

The nutrient content of lunches depends upon the amounts and types of foods served plus preparation and storage techniques. To improve nutrient content, school districts should consider all these factors.

One proposal for meeting the goal for 15- to 18-year-olds is to increase the quantities of food required by the meal pattern. In 1976 USDA's Consumer and Food Economics Institute issued a report on the meal pattern and students' eating habits and nutritional needs. The report recommended that the meal pattern be adjusted for different age groups in order to better provide for the nutritional needs of younger and older children. Based on this report, USDA proposed regulations (Sept. 9, 1977) that would have increased the requirements for students 12 years and older to 3 ounces daily for meat/meat alternates and to 10 servings a week for bread/bread alternates. The requirements for fruits/vegetables and milk remained at three-quarters of a cup and one-half pint, respectively. However, these amounts were presented as recommended rather than required amounts in the May 1980 final regulations because of negative public comments. The changes were opposed for several reasons, including possible increases in food costs, labor costs, and plate waste.

Our 1978 report on elementary school lunches found that compliance with the meal pattern did not ensure meeting the one-third RDA goal and recommended that the Department modify its meal pattern. However, we recognized that simply increasing the quantities of food served may not be a satisfactory solution because students frequently do not eat all food served.

Our recent analysis similarly showed that high schools serving the increased food quantities recommended for older students did not meet the one-third RDA goal for their lunches. New York, for example, served the recommended meal pattern for older students, including an average of over 3 ounces of meat/meat alternate and over 10 slices of bread per week in its conventional lunches, but still did not meet three of the nutrient goals. Fulton County's fast-food lunches at one school also included the increased quantities but did not meet nine of the nutrient goals for males and five for females.

A second way schools could improve the nutrient content of their lunches is to improve the types of foods served. The quantities specified in the meal pattern are based on the assumption that schools will serve a wide variety of foods. USDA's menu planning guide encourages schools to serve a variety of foods and gives some guidance on incorporating foods that contain vitamins A and C and iron into lunches. The guide lacks specific guidance on incorporating other nutrients. We found that foods that contain many of the problem nutrients were frequently not served. For example:

--Organ meats such as liver are rich sources of iron, folacin, thiamin, and zinc but are seldom served because many students do not like them.

--Whole-grain breads and cereals are good sources of folacin, vitamin B-6, thiamin, magnesium, and zinc--all problem nutrients--but most districts do not serve these whole-grain products. Fulton County, which consistently served whole-grain breads and pasta in its conventional lunch, did best in meeting the one-third RDA goal for these problem nutrients.

--Schools do not usually serve a wide variety of fruits and vegetables. Some form of potatoes, corn, green beans, peas, apples, and oranges are commonly served, but dark-green leafy vegetables such as spinach, yellow vegetables such as squash, and dried fruits such as raisins and prunes are served infrequently. This is a particular problem in the fast-food format where a typical meal, such as a cheeseburger and french fries, does not combine well with vegetables such as spinach.

Also, some meats have less nutrient value than others. Therefore, a lunch with a 2-ounce portion of these meats will contain fewer nutrients than one with 2 ounces of a more nutritious meat. These less-nutritious meats are often inexpensive and thus appealing to cost-conscious schools.

Cooking, preparation, and storage methods can destroy nutrients that were originally present in the food and thus lower the lunches' nutrient contents. Water-soluble vitamins such as vitamin C and folacin are particularly vulnerable to such losses.

CANS: an alternative to the meal pattern

CANS menu planning presents a promising but unproven approach to better ensuring that nutritional goals are met. Such a system could eliminate many problems associated with the meal pattern, particularly the guesswork as to how much and what types of food should be served to meet the one-third RDA goal. School districts now using CANS believe that students receive a greater density of nutrients in their lunches and that they waste less food. CANS also has the advantage of considering the nutrients in all foods served, such as eggs or apples used in baking. San Diego's computer operators take student preferences, eye appeal, kitchen capacities, and production problems into consideration in producing computer-generated menus.

Our tests revealed a major problem with nutrient-based menus that would have to be addressed before this type of system would be practical on a national basis. These menus--based on nutrient data taken from USDA's Handbook #8--do not take into consideration nutrients which may be lost during excessive storage or cooking. For example, we found that a food which the handbook

lists as a source of vitamin C had none when tested in the laboratory.

Another factor affecting the use of a nutrient standard is fortification. For one of the lunches tested, vitamin C and iron goals were attained by including gelatin fortified with vitamin C and iron. USDA officials said that the issue of fortifying or not fortifying foods must be resolved before nutrient-based menu planning can be further evaluated as an alternative to the meal pattern. School food service officials told us that fortification may be feasible for some nutrients but generally rejected the idea as a widespread technique for providing nutrients. They were concerned that fortification of certain foods might cause schools to reduce the variety of foods served and thereby increase the probability of not getting some nutrients for which RDAs have not been established or which have as yet not been identified.

Other considerations in adopting a CANS system are that:

--The nutrient standard is more sophisticated than the meal pattern and requires more expertise to implement. One district using CANS believed that the extra work required to implement CANS resulted in high morale and a more competent staff. However, one official from another district said that preplanned menus destroy employees' incentive for innovation. Others were concerned that smaller school districts may not have the staff or food production capabilities to implement such a system.

--The meal pattern allows more flexibility than CANS. One official said that schools could end up serving a limited number of menus. Nevertheless, San Diego's computer has developed about 1,200 menus. Officials said that donated commodity delivery and acceptance practices would need adjusting to avoid complications caused by menu substitutions and food overstocks. This is especially important at the end of the school year when food inventories must be used up.

--Installing and operating a computer system would be expensive, especially if additional critical nutrients are added to the data bank. San Diego officials said that the system is expensive initially, but once CANS is implemented a district would find that food and labor costs are lower than with meal-pattern systems. A CANS computer system also offers substantial business applications, such as inventory control and meal pricing.

Problems with improving the nutrient content of lunches

By adjusting the types and amounts of foods served and taking greater care in preparation, school districts could provide one-third of the RDAs at lunch and thus meet the program's nutrition goal. However, food service officials told us that several

factors besides nutrition must be considered when deciding how to improve lunches.

--Increasing quantities of food served may lead to increased plate waste. In our 1977 report we mentioned this as a concern because we found that students frequently did not eat all food served.

--Meals must appeal to students or they will eat elsewhere or throw away foods they do not like.

--The "offer-versus-serve" provision that allows students to decline up to two of the five lunch components can seriously impair achievement of the nutritional goal depending on the number and type of components declined.

--School districts may not be able to afford to increase the quantities of food served or may sacrifice serving high-quality foods in order to serve increased portions of less nutritious foods. In 1977 New York City increased its requirement for meat and meat alternates from 2 to 3 ounces but, because of the cost involved, reduced that portion size back to 2.2 ounces.

Recently enacted legislation could have an important impact on the nutrient content of school lunches and on program goals. On August 13, 1981, the President signed the Omnibus Budget Reconciliation Act of 1981 which calls for the Secretary of Agriculture to review program regulations, including those pertaining to the meal pattern, and, if necessary, make changes to effect cost savings in program operations. Although the act states that such changes are not to impair the nutritional value of the meals served by schools participating in the program, the kinds of changes made will dictate in large part the practicality of having a specified RDA goal.

CONCLUSIONS

None of the secondary school lunch formats tested in the seven school districts reviewed met the program's goal of providing, over time, one-third of the students' RDAs even though the lunches as offered, on the average, met or exceeded the amounts of food required in the meal pattern. Some nutrients did not even meet one-fourth RDA. These nutritional deficiencies are similar to those we found in our 1978 analysis of elementary school lunches. The conventional format came closer to meeting the goal more often than the salad or fast-food formats; however, all three formats had problems providing the recommended levels of seven important nutrients.

It is beyond the scope of this review to determine if one-third of the recommended dietary allowances is a practical goal for the National School Lunch Program. The recent enactment of the Omnibus Budget Reconciliation Act of 1981 makes the establishment of an RDA goal particularly uncertain because, if the

Secretary chooses to reduce the amounts of food in the meal pattern, it may not be possible to meet a one-third RDA goal. However, our reviews have shown that compliance with USDA's required meal pattern set up to achieve a specified goal does not ensure achievement of that goal and that, in actual practice, school lunches fall short in important nutrients. If USDA believes that meeting a specified RDA goal is important, it needs to take steps to ensure that the goal is met without unacceptable impacts on plate waste, cost, and student participation. If not, USDA should make clear that there is no specified RDA goal and that school lunches may, in fact, not be providing the amount of nutrients previously assumed.

CANS menu planning presents a promising but unproven approach to better ensuring that an RDA goal will be met. We believe that USDA should assist districts using CANS to test this approach further, particularly to determine how they can eliminate differences between the nutrients the computer said would be present in the lunch and the nutrients in the lunch as served.

RECOMMENDATIONS TO THE SECRETARY OF AGRICULTURE

We recommend that the Secretary take a fresh look at USDA's one-third RDA goal for school lunches and decide whether:

1. The achievement of some specified goal--such as one-third RDA--within acceptable limits of plate waste, cost, and student participation is unnecessary or impractical, and therefore the goal should be dropped and the program should operate simply on the basis of providing a variety of foods within a specified meal pattern or some other achievable criteria.

2. The serving of lunches that will provide either one-third or some other specified percentage of the RDAs over time is considered important for students' nutritional well-being, and therefore ways must be developed to ensure that the goal is essentially met within acceptable limits of plate waste, cost, and student participation.

Ways to help school districts serve more nutritious lunches within a specified meal pattern might involve some part or combinations of efforts such as

--requiring different quantities of food to be served to different age groups,

--specifying certain foods that must be served within each meal-pattern category,

--expanding the Service's menu planning guide to include lists of nutrient-rich foods for nutrients not currently listed in the guide,

--providing guidance through suggested menus and recipes on how to incorporate "problem" nutrients into the lunches,

--providing guidance on minimizing loss of nutrients through preparation and storage, and

--implementing the CANS menu planning system nationwide after working with school districts currently testing CANS to reduce the differences in expected and actual nutrient content of computer-planned meals.

Other ways to achieve an RDA goal should be explored within USDA and with school food authorities and recognized experts in nutrition and food service.

AGENCY COMMENTS AND OUR EVALUATION

USDA agreed with us that the nutritional goal of the meal pattern should be reexamined. USDA informed us that a task force including local, State, and Federal program administrators; public interest groups; and representatives from the nutrition profession would make recommendations to alter or change the pattern based on its review. USDA also informed us that our recommendations will be considered by the task force.

In its reply to our draft report, USDA implied that our comparison of 1980 RDAs for 15- to 18-year-olds with the nutrient content of high school lunches served was invalid because the lunch pattern at the time of our review was based on the needs of 10- to 12-year-old children at 1974 RDA levels. We believe using the 1980 RDAs for 15- to 18-year-olds as the basis for our comparison is valid and makes the results of our review and related recommendations more applicable to the present high school lunch program. Further, we believe that differences in 1980 and 1974 RDAs and the differences in nutrient requirements for 15- to 18- and 10- to 12-year-olds have no real impact on the validity of our findings.

The only change in the RDAs between 1974 and 1980 for the problem nutrients was an increase in the vitamin C requirement. The only change in the required meal-pattern portion sizes (based on 1974 RDAs) in effect at the time of our review and the present meal pattern (based on 1980 RDAs) is an increase in the bread requirement. This would have little or no impact on the vitamin C level in the meals. In addition, the districts reviewed were serving enough bread items at the time of our review to meet the present meal pattern. For these reasons, we believe it is acceptable to compare the nutrient content of the lunches reviewed with the 1980 RDAs.

The program's goal is one-third of the RDAs for all students, regardless of age. We recognize that USDA recommends that larger portion sizes be served to older students in attempting to meet the goal, but USDA does not require schools to serve 15- to 18-year-olds any more than they serve 10- to 12-year-olds. If the

meals analyzed were evaluated based on the needs of 10- to 12-year-olds, some lunch formats would show improvement by coming closer to meeting the one-third RDA goal but none would meet all the requirements. This would be true even though, as noted on page 10, some of the districts visited were serving the increased portion sizes recommended for high school students.

The complete USDA reply to our draft report is included as appendix I along with our comments on miscellaneous matters raised by USDA.

CHAPTER 3

INCREASED LUNCH CHOICES BOOST STUDENT PARTICIPATION

Although many factors influence students' decisions to eat or not eat school lunches, offering senior high school students a greater selection of foods seems to increase their school lunch program participation. In the three school districts where we could compare participation before and after they added a fast-food format to the existing lunch format and/or made substantial changes in the eating environment of senior high schools, the student participation rates in the lunch program increased from 7 to 18 percentage points. Increased participation came not only from students receiving free or reduced-price lunches but also from the students paying full price.

Other major factors considered to have an impact on student participation but which we were unable to measure include student involvement in menu planning and food selection, food quality, competition from off-campus restaurants, length of lunch periods, and whether students are permitted to leave campus during the lunch period. Lunch prices, eating environment, nutrition education, competing food sales from student groups, and weather also affect student participation.

Because each of the above factors--some of which are not controlled by a district's food service division--varies significantly between school districts, we believe comparing one district's participation with another's to be inappropriate. We believe, however, that participation data within a district can show useful trends.

ADDITIONAL STUDENTS ATTRACTED BY INCREASED FOOD CHOICES

Many high school students for a variety of reasons choose not to eat the school lunch offered. Some eat at home, some carry their lunches, and others eat off campus at fast-food restaurants. To compete with such alternative food sources, school districts sought greater student involvement in the lunch program and tried to offer more appealing food, fast-food items, salad bars, or increased choices in conventional lunches.

In 1973, for example, Clark County, Nevada, replaced its conventional format in senior high schools with a fast-food format currently offering a choice each day of 15 fast-food combos and a salad bar closely resembling the food offered by fast-food chains. Three other school districts reviewed--San Diego, South-Western City, and New York City--expanded their senior high school lunch program by adding a fast-food format. At the two high schools we reviewed in New York City, the eating environments were substantially changed and dubbed "Energy Factories." (See app. III.) Milwaukee retained its one format, the conventional lunch, and continued to heavily involve the students in menu planning and food selection. Dade County, Florida, has been

offering several lunch formats since 1965 and also offers several choices of foods in the conventional format. A student, for example, could choose between three or four vegetables and fruits offered. Fulton County, Georgia, introduced its "Nutra" program in 1976--serving natural foods, eliminating preservatives and additives, and reducing salt and fat. Five of the 17 Fulton County high schools offer the Nutra program.

Only three districts--San Diego, South-Western City, and New York City--changed their lunch programs recently enough to allow before-and-after comparisons of senior high school student participation rates.

School district	Year lunch program changed	Senior high school participation (note a)		
		School year	Rate of participation	Rate of increase
			(percent)	
San Diego	1977	1976-77	7	
		1979-80	14	100
South-Western City	1978	1977-78	31	
		1979-80	41	32
New York City (note b)	1978	1977-78	44	
		1979-80	62	41

a/Participation was computed by dividing the average number of lunches served each day by the average daily attendance. The average number of lunches is the total number of lunches served during the school year divided by the total number of days that lunches were served.

b/New York City statistics apply only to the two high schools which had Energy Factories at the time of our review.

School food service directors at the locations we visited generally believe that school lunch participation had increased as a result of the efforts made to make the meals more attractive to students.

Fulton County's food service director believes that food quality and closed campuses that prohibit students from leaving school during lunch periods are major factors in maintaining its student participation. For high school students in the 1979-80 school year, the participation rate was 77 percent.

Milwaukee's food service director believes that the heavy student involvement in menu planning enabled the district to maintain its student participation levels. For the 1979-80 school year, high school student participation in Milwaukee was 46 percent.

In Dade County--which offers conventional, fast-food, and salad formats--41 percent of senior high school students participated during the 1979-80 school year.

Clark County's food service director told us that only 10 percent of senior high school students participated before fast foods were introduced in 1973. For the 1979-80 school year, 27 percent of senior high school students in Clark County participated.

POSTERS ENCOURAGE SAN DIEGO STUDENTS TO PARTICIPATE.

More paying students participating in school lunch program

The extent to which school lunch programs are able to get paying students to participate is an indicator of how well they compete with off-campus food sources. The competitive edge may be due to factors such as price, food quality, or lunch formats offered. As shown below, the number and percentage of full-price lunches increased over the past 3 years at senior high schools in five of the seven districts visited.

School district	School year	Senior high school lunches	
		Full-price lunches	Percent of total
Clark County	1976-77	589,796	73
	1979-80	723,284	79
Dade County	1976-77	1,425,561	53
	1979-80	2,017,733	60
New York City (note a)	1976-77	24,445	10
	1979-80	41,114	11
San Diego	1976-77	44,201	14
	1979-80	248,214	41
South-Western City	1976-77	194,987	82
	1979-80	270,670	86

a/New York City statistics apply only to the two high schools which had Energy Factories at the time of our review.

Impact on participation from student input to menu planning

Although the impact that student involvement in menu planning and food selection had on students' lunch program participation is not measurable, food service officials said that student involvement generally increases the acceptability of the lunches offered. Student as well as parent involvement is required by Service regulations issued in August 1979. This requirement is consistent with a recommendation in our January 1977 and February 1978 reports that USDA make greater efforts to encourage State and local school authorities to improve school lunch facilities and atmosphere. The States are specifically required to monitor district efforts to comply with this requirement as a part of their overall monitoring of school district operations.

Student groups in four of the seven districts visited--Fulton County, Milwaukee, New York City, and San Diego--played a major part in menu planning. Senior high school students participate in taste tests, plan menus, and recommend food selection. In Milwaukee the student advisory group also evaluates the menu cycle on the basis of fellow students' feedback and has successfully obtained changes in the menu cycle.

Students in the other school districts have input to menu planning in less formal ways. Clark County uses market demand in deciding which combos to offer in its lunch program. Generally, the two least popular combos are replaced each year. The food service manager for the South-Western City School District believes participation and plate waste best indicate student preferences and plans district menus accordingly. In Dade County, students voice their concerns or food preferences through the cafeteria managers for the Food Service Division to consider.

WHY MORE STUDENTS DO NOT EAT A SCHOOL LUNCH

Food service officials believe the following factors have the greatest negative impact on senior high school student participation in the school lunch program.

--Open campuses where students are free to leave and eat elsewhere.

--Competition from off-campus fast-food restaurants, especially those near the school.

--Short lunch periods and long waits for service.

Also, food service officials believe that participation is minimally affected by small increases in the lunch prices, the need for more nutrition education, and sales of competitive foods by student groups.

Although not specifically mentioned by food service officials, we believe weather conditions also affect participation. It seems likely that more students will go off campus to eat in mild, clear weather than in harsher, inclement weather. Consequently, districts like San Diego, Clark County, and Dade County tend to have more students eating off campus during the year than districts like Milwaukee and South-Western City.

CONCLUSIONS

Senior high school students, especially those who pay full student prices for lunch, generally can choose where they will eat lunch. On the basis of our observations and discussions with school food service officials, all other things being equal, if participation by senior high school students increases, where school districts make efforts to provide lunches that appeal to the students, such efforts can be considered successful. We found this to be true when different types of lunches, like fast foods and salads, were added to a program and students became more involved in menu planning, food selection, and cafeteria decorating.

CHAPTER 4

PLATE WASTE IN INNOVATIVE LUNCH PROGRAMS

Plate waste--food served but not eaten--in the National School Lunch Program has been of concern to the Congress, USDA, school food service personnel, and nutritionists for years. In our review of high school lunch programs, therefore, we tried to assess the impact of innovative lunch programs and other factors on plate waste.

We found conventional format plate waste averaged about 13 percent compared with 9 percent for fast-food format waste. This generally resulted because of the greater waste of vegetables/fruits and bread items in the conventional format. Overall, milk had the highest rate of consumption while the vegetable/fruit category had the lowest. Females on the average left more food than males.

Food service officials believed that the offer-versus-serve option allowing students to refuse some food items and serving a variety of foods from which students may choose are significant factors in reducing plate waste.

METHODOLOGY

To obtain an estimate of plate waste, we visually measured the uneaten portion of students' lunches. Visual measurement was selected over weighing because it is (1) considered to be just as effective as weighing the uneaten portion, (2) quicker, and (3) no less accurate. 1/

We observed complete, five-component lunches served to students and, after the students finished eating, visually gauged the uneaten portion to determine the food waste. We made observations at two high schools in each district reviewed. At each school, we generally observed 40 students a day for 2 days--10 males and 10 females for conventional lunches and 10 males and 10 females for fast-food lunches. We observed plate waste for 2 days at most schools but some required additional days to observe a total of 40 students. These observations may not be representative of all high schools in a district due to the many factors having an impact on plate waste which are discussed later in this chapter. Salad format lunches were not selected for plate waste measurement. Because the salads were not preportioned in most cases, we could not determine how much salad was taken. Our review was directed toward determining nutrient content of complete lunches; thus we did not observe plate waste

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1/Simple Research Techniques for School Foodservice, Paul A. Lachance, Ph. D., Professor of Nutrition Physiology, Cook College, Department of Food Science, Rutgers University, New Brunswick, N.J.

for lunches where students took less than a complete lunch under the offer-versus-serve option.

RESULTS OF OUR PLATE WASTE STUDY

The school districts in our review had not performed any plate waste studies immediately before implementing lunch program innovations in their schools. Consequently, we could not make before-and-after comparisons to measure the impact program innovations had on plate waste in the respective districts. However, food service officials in each district believed their program innovations reduced plate waste in their districts.

The following table shows the results of our plate waste study by school district and by lunch format. Comparisons among districts would be inappropriate because of the varying factors influencing plate waste.

Plate Waste Percentage by Format

Lunch format	All districts	Clark County	Fulton County	Dade County	Milwaukee	New York City	San Diego	South-Western City
Conventional:								
Male	10	(a)	13	9	10	12	11	5
Female	17	(a)	27	17	13	18	15	12
Average	13		20	13	12	15	13	8
Fast food:								
Male	6	6	8	7	(a)	5	3	4
Female	12	8	17	19	(a)	11	5	13
Average	9	7	13	13		8	4	8

a/Not offered in this district.

Conventional lunch plate waste was generally higher than fast-food plate waste. Vegetable/fruit and bread plate waste of conventional lunches was higher than similar components of the fast-food format. This indicates that sandwich-type entrees may include bread in more acceptable forms than the bread or rolls accompanying a conventional lunch. Similarly, french fries or tater tots commonly served with fast-food lunches may be more acceptable than the yellow and green vegetables or potatoes served in conventional lunches.

As shown in the table, females wasted more food than males--17 percent in the conventional format and 12 percent in the fast-food format for females versus 10 and 6 percent, respectively, for males. Although the reasons for this difference are uncertain, school food service officials in several districts said

that females may eat less because they are more weight conscious. Some support for this is found in the fact that females consistently ate less of the food taken than males in both the conventional and fast-food formats.

Significant variations existed in the amount of plate waste for different components. Vegetable/fruit plate waste was almost double the average waste for the entire lunch in several districts. Bread was the second most wasted component while milk was the least wasted.

State or local lunch requirements may have an impact on plate waste. For example, Fulton County had more vegetable/fruit and bread plate waste in the conventional lunch than any other district. But at the time of our review, the State of Georgia required larger servings of some lunch components. For example, it required 1 cup of vegetable/fruit compared with the three-fourths cup Federal requirement. The schools visited also were offering two bread servings instead of one. Thus, the State-mandated requirement was probably a major factor contributing to the higher plate waste of these two items in the district.

FACTORS CONSIDERED TO HAVE AN IMPACT ON PLATE WASTE

At each district, we discussed with food service officials the factors they considered to significantly affect plate waste. Officials in five of the seven districts thought the offer-versus-serve option allowing high school students 1/ to refuse one or two of the five components offered was the most significant factor. By selecting only those foods they want, the students presumably would eat the food they take, thus reducing plate waste. This seems reasonable, but we have no specific data on this option because, as noted earlier, our plate waste study did not include offer-versus-serve lunches. We surveyed plate waste only where students took a complete five-component lunch.

Officials in four of the seven districts said that offering a wider variety of foods each day decreased plate waste. Food service officials in three of the seven school districts considered two other factors to have a major impact on plate waste:

1/The Omnibus Budget Reconciliation Act of 1981 gives elementary schools the option of using offer-versus-serve.

Note: A November 1978 report (Pilot Study to Compare Type A Lunches with Alternative Subsidized Lunches Among High School Students) on a study by Colorado State University for USDA included data on plate waste for the five-component conventional lunch. The study at 48 senior high schools across the Nation, using a before-and-after weighing methodology, showed overall plate waste of 10 percent. This report also discussed several other studies, including one showing 10- to 11-percent plate waste in secondary schools.

--Lunchroom atmosphere. For example, promoting the cafeteria as the "in" place to be encourages students to stay and finish their lunch. On the other hand, a crowded, noisy, or unruly cafeteria may influence a student to eat and run, thereby leaving more plate waste.

--Nutrition education. Although food service personnel were uncertain whether nutrition education was a factor in reducing plate waste at the high schools visited, they generally thought nutrition education could have a positive impact on plate waste. Parents, teachers, and lunchroom personnel can teach children good eating habits. According to one food service director, food service departments should emphasize getting kindergarten and elementary school children "turned on" to a good diet because of the difficulty involved in teaching good nutrition to high school students with established eating habits.

In addition, officials in two districts thought improving cafeteria supervision was a major factor in reducing plate waste. Officials in another district thought student input to menus via taste testing and the attitude, pride, and service of food personnel helped reduce plate waste.

The following factors generally were considered by food service officials to have only a minor impact on plate waste:

--Length of lunch period. Food service officials in six of the seven districts visited thought lunch periods were long enough to provide students adequate time to eat and that time had only a minor impact on plate waste.

--Portion size. Food service officials in one district believed excessive amounts of food served to some students, particularly females, was a major cause of plate waste. However, officials in the other six districts believed that serving the quantity of food specified in the present meal pattern was only a minor factor in plate waste.

--Food preference related to sex, race, or ethnic background. Food service officials in five of the seven districts believed that lunches served were acceptable to most students regardless of sex, race, or ethnic background and, consequently, particular preferences did not significantly affect plate waste.

--Whether students paid for or received lunches free. Food service officials in all seven districts believed that plate waste was the same whether students paid for lunch or received it free.

CONCLUSIONS

The size of our sample was too small to yield any overall, conclusive results on plate waste. However, our discussions with food service officials indicate that, while many factors may affect plate waste, the offer-versus-serve option and serving a variety of foods have the greatest impact in reducing plate waste.

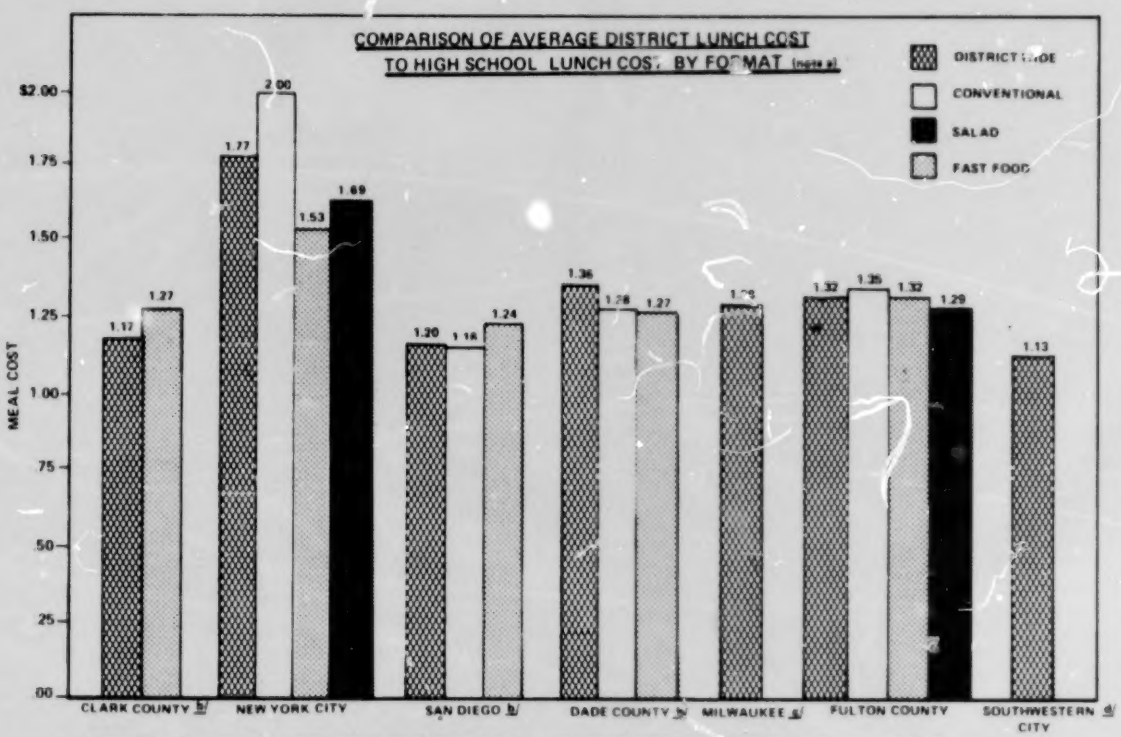
CHAPTER 5

INNOVATIVE LUNCH PROGRAMS NEED NOT INCREASE COSTS

Having fast-food and salad formats in addition to the conventional format in a lunch program need not increase the cost of providing a school lunch. In the districts reviewed, lunch costs of the several innovative approaches offered in secondary schools were lower than the average district lunch cost in some districts and higher in others. In all districts reviewed, average lunch costs continually increased from school years 1976-77 through 1979-80. The numbers obtained are not as precise as we would like because the school districts generally did not compile costs by format or school level--requiring us to make assumptions and cost projections to develop such costs. However, they do suggest that innovation is not necessarily more costly.

MULTIPLE LUNCH FORMATS NOT ALWAYS MORE COSTLY

As shown on the following graph, the cost of the different secondary school lunch formats varied up to 24 cents from their average district lunch cost. However, we found no clear pattern of increased or decreased lunch cost caused by offering multiple formats.



a/ THE DISTRICT AVERAGE IS BASED ON THE 1979-80 SCHOOL YEAR, AND FORMAT COSTS ARE BASED ON 1 MONTH DURING THE FALL OF 1979.

b/ DISTRICT PROVIDES SALAD FORMAT BUT COSTS WAS UNAVAILABLE

c/ COSTS FOR HIGH SCHOOLS NOT AVAILABLE

d/ COSTS BY FORMAT NOT AVAILABLE

Cost comparisons between districts are probably inappropriate because the procedures for recording and maintaining cost data varied widely from district to district and our estimates varied with the availability of data. Despite their limitations, however, the graph suggests that having more than one format does not necessarily increase the cost per lunch served.

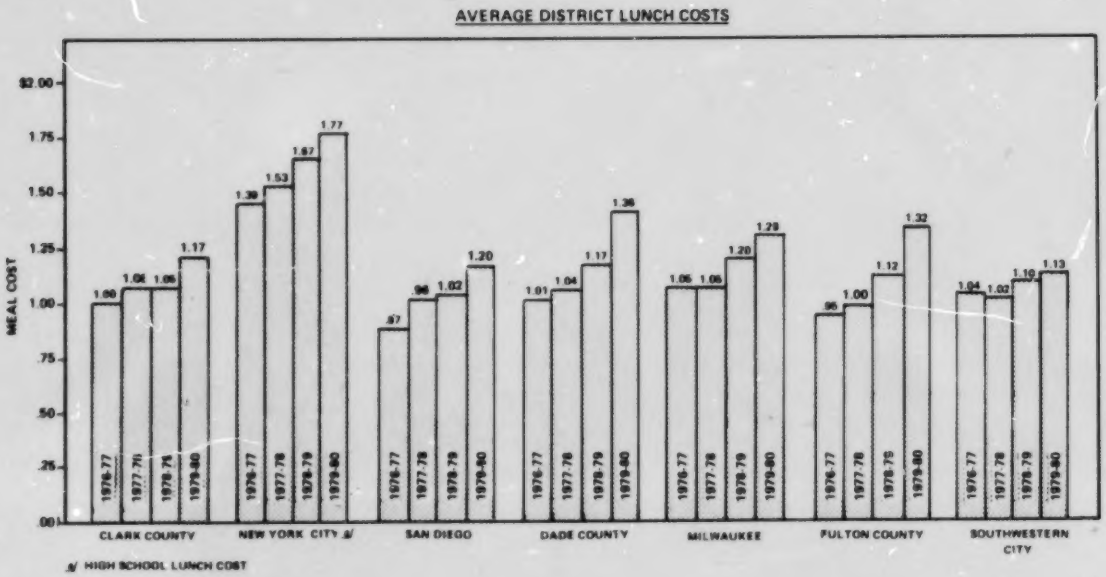
Because of different circumstances at the locations reviewed, we used different methods in different districts to estimate the same cost categories. Estimating was necessary because school districts maintained records by district and not by elementary or secondary school level or lunch format.

For example, food costs were accumulated for us by the staff of the two secondary schools visited in one district. We divided these costs by the number of meals served to arrive at a food cost per meal for the two schools. The average of these two figures was used as the secondary school food cost per meal for the district. In another district, we developed food costs by averaging available data on menu costs for 1 month and assumed that such food costs would be representative of all district secondary schools on the basis that each menu was served at all the schools to about the same number of students.

We also used estimates because some school boards did not require that the food service division be charged for all applicable indirect costs (such as utilities), and most of the school districts reviewed did not record all indirect costs applicable to food service.

DISTRICT MEAL COSTS INCREASING

Average school district lunch costs continually increased from school years 1976-77 through 1979-80. Lunch cost increases ranged from 9 percent in South-Western City to 35 percent in Dade County. New York City had the largest dollar increase from $1.39 a meal to $1.77 (in the high schools only) while South-Western City had the smallest increase from $1.04 to $1.13. The following graph shows the average district meal costs for the period of our study.



As previously noted, we believe it is inappropriate to compare school lunch cost data between school districts because districts operate under different conditions and constraints. For example:

--Some districts prepare more lunches from basic ingredients than other districts that purchase more ready-made lunch components.

--The amount of special equipment (warming lights, dough mixers, bun slicers, microwave ovens, milkshake dispensers, grills, and deep-fat friers) used in producing lunches varied among districts.

--Some districts send their Government-furnished commodities to private processors and receive processed products in return; others produce food products from commodities in their own kitchens.

--One district had a management company run its food service department while the others were run by school district employees.

--The cost of food service labor varies between geographic areas of the country and by the extent to which food service personnel are unionized.

New York City school food service personnel, for example, are all unionized and paid union wages, while Clark County supplements its kitchen staff with student labor at the minimum wage.

STUDENT HELP DECREASES CLARK COUNTY LUNCH COSTS.

CONCLUSIONS

In spite of continually increasing school lunch costs, most of the school districts reviewed have been able to provide innovative lunch programs to their secondary school students at a cost that does not seem to be significantly out of line with their average district lunch costs.

CHAPTER 6

SCOPE AND METHODOLOGY OF NUTRIENT REVIEW

A major goal of our review was to compare the level of nutrients offered by various lunch formats with the Service's goal of providing students with one-third of the RDAs for nutrients and its expectation that lunches would provide 22 percent of the RDA for calories.

To meet our goal, we obtained lunches at 15 schools in 7 school districts and packaged and shipped them to Raltech Scientific Services, Inc., for weighing and nutrient analysis.

SELECTING LUNCHES FOR COMPARISON

In each school district, we selected two secondary schools with characteristics (such as enrollment, size of lunch program, and number of free and reduced-price lunches served) approximating district averages. We randomly selected lunches served at the two schools in each district. Also, in San Diego we selected CANS lunches from one elementary school. We obtained complete lunches as offered at each location, therefore, the results of our analyses depict nutrients offered to students and not nutrients consumed by students. We included dessert items in our samples where dessert was offered as part of a reimbursable lunch. For schools that sold a la carte items, we included only those items that were available as part of a reimbursable lunch. Our lunch selection procedures varied depending on the formats offered at the schools.

For the conventional format, we randomly selected two lunches at each school each day for 5 days. Although conventional lunch components were packaged separately, all samples for the week were combined for analysis to determine nutrient content of the conventional format over time. The results indicate whether a student would be provided one-third of the RDAs for various nutrients if he or she ate a complete conventional lunch daily.

For the salad bar lunches, we observed the volume of salad taken by high school students and selected daily samples of approximately the same volume from the full range of ingredients offered on the salad bar. The daily samples for the week were combined for analysis, and the results indicate the amount of nutrients a student would receive if a salad bar lunch were eaten daily.

The fast-food format could not be tested in the same manner because, in most cases, students were able to choose among several entrees each day, making a weekly average undeterminable. Consequently, instead of a 5-day composite sample, we had each fast-food entree analyzed separately to determine whether it contained one-third of the RDAs for the nutrients tested. In most cases, the fruit/vegetable and milk components were the same regardless of entree so we had these components analyzed

separately and combined the results of these tests with those for each entree to arrive at a nutrient content for a fast-food meal. The figures on the nutrient content of fast-food presented in the graphs in appendix II were arrived at by averaging all the fast-food lunches available for one week. While an actual weekly average obviously depends on individual student selections over a week, our analysis results show whether a student is likely to receive one-third of the RDAs by eating a fast-food lunch in these schools every day.

For elementary school lunches prepared from CANS menus, we weighed individual menu items to assure that our analyses reflected computer-produced menu requirements. This precluded variances in portion sizes from affecting our results. We selected four CANS lunches each day, and each day's sample was analyzed separately to determine whether the average lunch contained one-third of the RDAs for tested nutrients and whether the average lunch contained the nutrients programed into the computer.

We generally collected milk and milkshake samples the day before we shipped lunches to Raltech. Where schools offered flavored milk products as well as unflavored milk and milks of different fat-content, we selected some of each for our sample based on the cafeteria managers' estimates of what the students normally selected.

PACKAGING AND SHIPPING LUNCHES

In accordance with detailed instructions provided by Raltech, we packaged the various lunch components individually whenever possible before we froze them. We packed the frozen lunch samples in dry ice and shipped them air express to Raltech. Raltech advised us that all samples arrived at Raltech frozen and in excellent condition.

MEAL-PATTERN COMPLIANCE TESTING

To assure ourselves that the secondary school lunches we selected for analysis met Service requirements for the basic lunch pattern, we had the laboratory weigh each component we had packaged. We compared these weights, or volumes derived from weights, with Service-required and -recommended weights. At the suggestion of a Food and Nutrition Service official, we used Agricultural Research Service Home Economics Research Report No. 41 or Agriculture Handbook No. 456 for our fruit/vegetable and milk weights per cup. From a Food and Nutrition Service April 16, 1979, letter on compliance testing, we used Attachment No. 2 to determine grams-per-cup equivalencies for meat/meat alternates and Attachment No. 5 to determine grams-per-cup equivalencies for bread/bread alternates. We were able to test most samples although we could not test some blended components such as burritos, pizza, or peanut butter cookies. Very few lunch components were significantly short weight and, in all cases, shortages were more than compensated for by overages in other lunches offered during the week.

We believe our samples are valid representations of the nutrients provided by lunches that included food components that met or exceeded meal-pattern minimums.

The results of our analyses of complete lunches cannot be used to describe students' nutrient intakes because lesser or different amounts of nutrients would be consumed when students

--do not take one or two food components under the offer-versus-serve provision;

--do not eat all food taken; and/or

--eat lunches during the week from two or three of the formats offered--for example, conventional lunches on 2 days and fast-food lunches on 3 days.

APPENDIX I

United States Department of Agriculture

Food and Nutrition Service

Washington, D.C. 20250

Reply to Attn. of:

July 14, 1981

Subject: Comments on GAO Report "Efforts to Improve the School Lunch Programs--Are They Paying Off?"

To: Henry Eschwege
Director
U.S. General Accounting Office

Through: Mary C. Jarratt
Assistant Secretary for Food and Consumer Services

Attached is the Department's response to the GAO Report. The Office of Budget, Planning and Analysis also reviewed the report but had no comments.

G. WILLIAM HOAGLAND
Administrator

Attachment

FNS FORM-600 (8-80)

Comments on GAO Report
"Efforts to Improve the School Lunch Programs--
Are They Paying Off?"

The information presented in the GAO draft report shows a good understanding of the specific meal requirements and a general appreciation for the inherent imprecisions connected with a food service operation.

The Department does have some concern regarding the study design, sample size, data analysis, and conclusions reached. In addition, there are several instances of technical inaccuracies.

[GAO COMMENT: After receiving these comments, we discussed this point with a USDA official. This official said that USDA's only concerns about study design, sample size, data analysis, conclusions, and technical inaccuracies were the six shown below and that this paragraph was introductory only.]

GAO asserts that the meal pattern's goal of one-third of the Recommended Dietary Allowances (RDA) was not met by any of the seven districts. However, while the meal pattern served is based on the needs of a 10-12 year old, GAO analyzed the nutrient content of meals served on the needs of 15-18 year olds. This technique, in effect, results in a comparison of "apples and oranges." The meal pattern's nutrient content should be analyzed upon the basis of the goal that the pattern is expected to meet. In addition, GAO uses the 1980 RDA, although at the time of the study, the lunch pattern was based on the 1974 RDA.

[GAO COMMENT: See discussion on pp. 15 and 16.]

In the section dealing with the nutrient analysis of lunches, GAO states that "... not meeting the goal does not necessarily mean that students' health is endangered." A similar statement is made in the digest. These statements are excessively strong and inconsistent with the report's acknowledgement that "... the RDA is expected to provide generous amounts of nutrients ... even if the proportion by lunch is low there may be no cause for concern."

[GAO COMMENT: We agree with USDA and have revised the report. See pp. ii and 6.]

The omission of offer versus serve lunches in the study did not give the complete picture of the school lunch program. There is some evidence to believe that the offer versus serve provision does help to reduce plate waste, but this factor was not examined. Although it is understood that it was necessary to get a complete lunch for analysis, the conclusions offered do not account for the offer versus serve provision.

[GAO COMMENT: We have revised the report to reflect the opinions of food service officials concerning the offer-versus-serve option. See ch. 3.]

In appendix II, the report implies that milk is fortified with vitamin C. Milk is not fortified with vitamin C. It is fortified with vitamins A and D.

[GAO COMMENT: We revised the report. See p. 43.]

In the discussion of cholesterol, GAO makes the statement that "Food sources also contribute to cholesterol which is found in abundant amounts in egg yolks and liver, and moderate amounts in dairy products, fatty meats, poultry, and seafood." In regards to the foods specified as having moderate amounts of cholesterol, this varies depending upon the type of food. It may be more accurate to state that there are wide variations in the amount of cholesterol found in foods such as dairy products, meats, and seafood.

[GAO COMMENT: We revised the report. See p. 53.]

GAO states that USDA is studying reducing the levels of salt in canned vegetables and cheese. USDA is only studying salt reduction in canned vegetables.

[GAO COMMENT: We revised the report. See p. 55.]

The Department agrees with GAO that the nutritional goal of the meal pattern should be reexamined. In fact, a task force composed of local, State, and Federal level administrators of the program, as well as representatives from the nutrition profession and public interest groups, are now conducting a review of the meal pattern, and they will make recommendations to alter or change the pattern. The task force will also take GAO's recommendations into consideration as it proceeds.

[GAO COMMENT: See discussion on pp. 15 and 16.]

NUTRIENT ANALYSIS OF LUNCHES

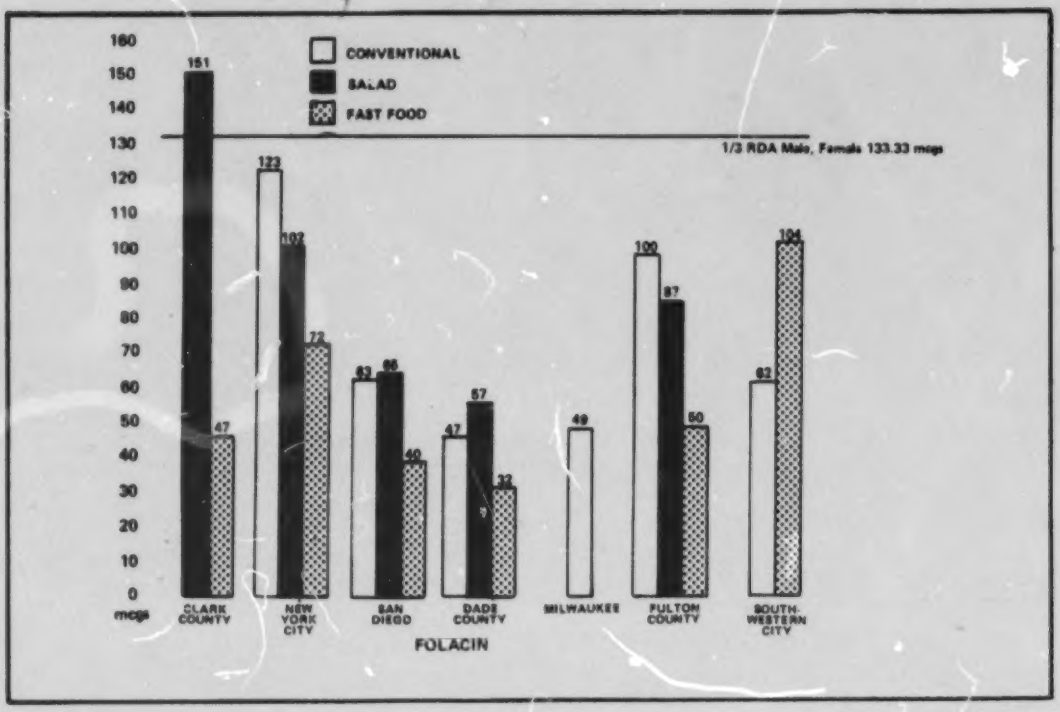
NUTRIENTS WITH SPECIFIC RDAs

The 1980 version of Recommended Dietary Allowances (see app. VII) sets specific levels for 17 nutrients. We tested for 14 of these. Because professional nutritionists believed that shortages of three nutrients--vitamins D, E, and B-12--were very unlikely, we did not test them. The following paragraphs discuss the testing results, highlight differences by lunch format or location, and discuss sources of the various nutrients. Where RDAs for males and females are different, we discuss the testing results in terms of each goal.

Folacin

Folacin (folic acid) deficiencies were widespread and serious. No fast-food or conventional formats met the folacin goal and only one salad format met it. Serious deficiencies--100 micrograms (mcgs) or below--were common in all three formats at most locations.

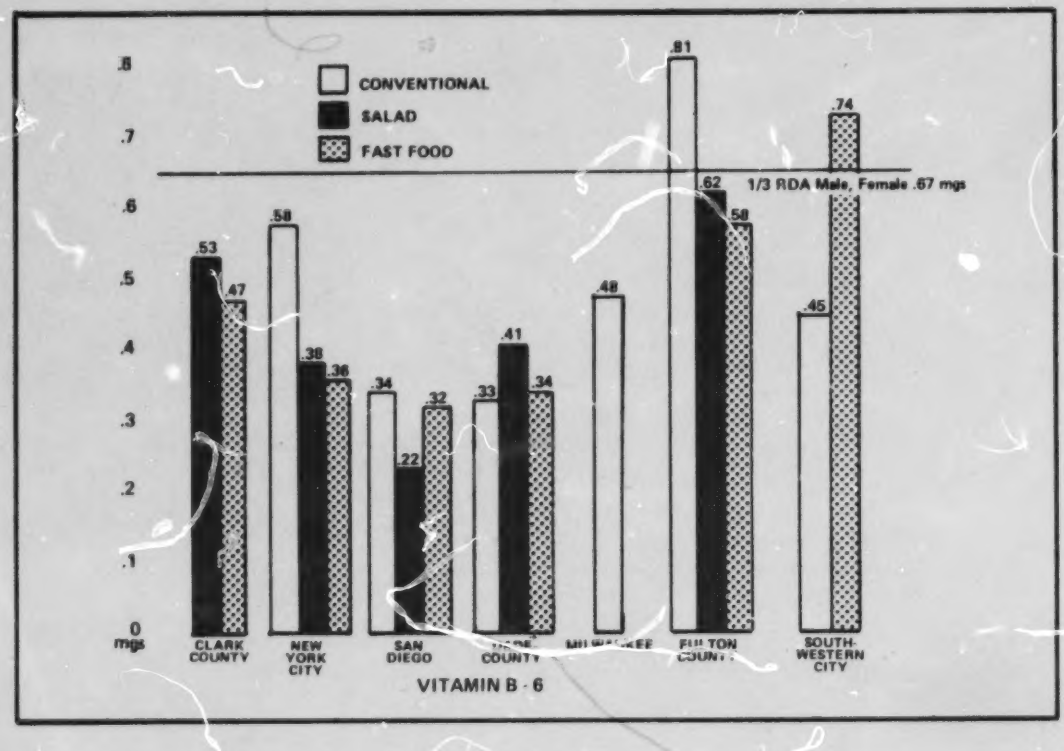
Green leafy vegetables, organ meats (such as liver), and whole-grain cereals are good sources of folacin. These foods are most often found in the conventional format. Because folacin is rapidly destroyed in prolonged cooking and during prolonged storage periods, much of this nutrient could be lost before the lunch reaches the student.



Vitamin B-6

Our tests indicated widespread and serious deficiencies of vitamin B-6 (pyridoxine). Only one format in each of two districts met the RDA goal. As with folacin, serious B-6 deficiencies--0.5 milligrams (mgs) or below--were common.

Vitamin B-6 is found in abundance in organ meats, whole-grain cereals, soybeans, peanuts, and wheat germ. Milk and green vegetables provide smaller amounts. Foods rich in vitamin B-6 are not frequently found in great quantity in any of the three formats.

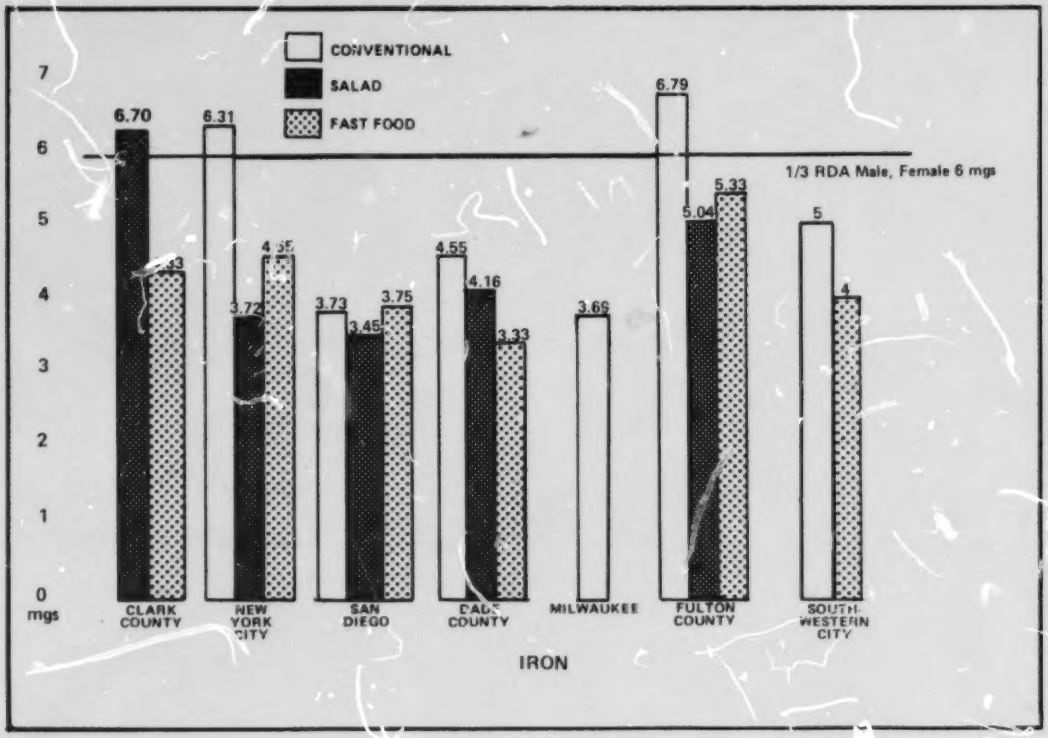


Iron

Iron deficiencies occurred in all formats with serious deficiencies--4.5 mgs or below--being more prevalent in the salad and fast-food formats.

Iron is found in varying amounts in a wide variety of foods (meats, vegetables, fruits, and breads), and USDA's menu planning guide recommends that each lunch include several foods that are worthwhile sources of iron to ensure that an adequate amount

of iron is offered to the age/grade group served. Organ meats, legumes (such as peas and beans), and raisins are listed in the guide and are rich in iron. However, these iron-rich foods are not offered frequently in any school lunch format. Consequently, iron deficiency was a major problem in all seven locations and remains a major impediment to the lunch program meeting its nutritional goal.

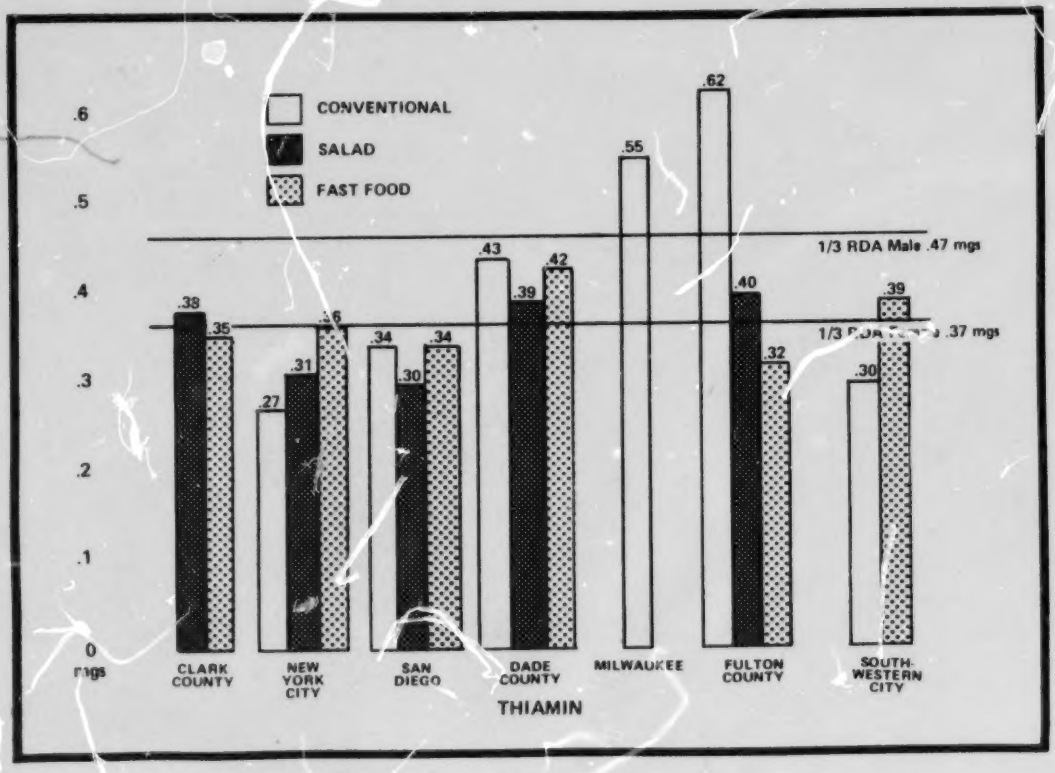


Thiamin

Our tests revealed that most lunch formats are deficient in thiamin (vitamin B-1). Serious deficiencies--0.35 mgs or below for males, 0.28 mgs or below for females--were commonly found among all three formats. Deficiencies were less common for females because of their lower thiamin requirement.

Thiamin is found in meat (pork and liver are especially good sources), legumes, peanut products, eggs, and enriched and whole-grain breads and cereals.

APPENDIX II

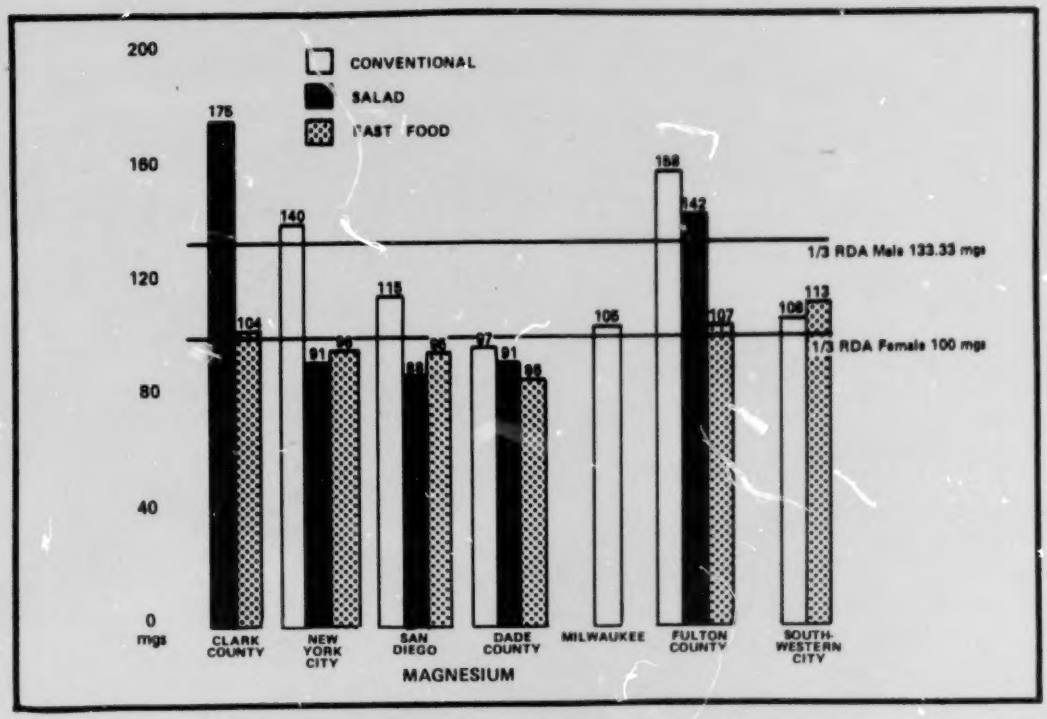


Magnesium

Meeting the magnesium goal for males was a problem in all three formats and a serious problem--100 mgs or below--in the fast-food and salad formats. Because of their lower magnesium requirement, females met their magnesium goal more often and no serious deficiencies in any format were found.

Magnesium is found in cereal grains, green leafy vegetables, nuts, and seafood.

APPENDIX II

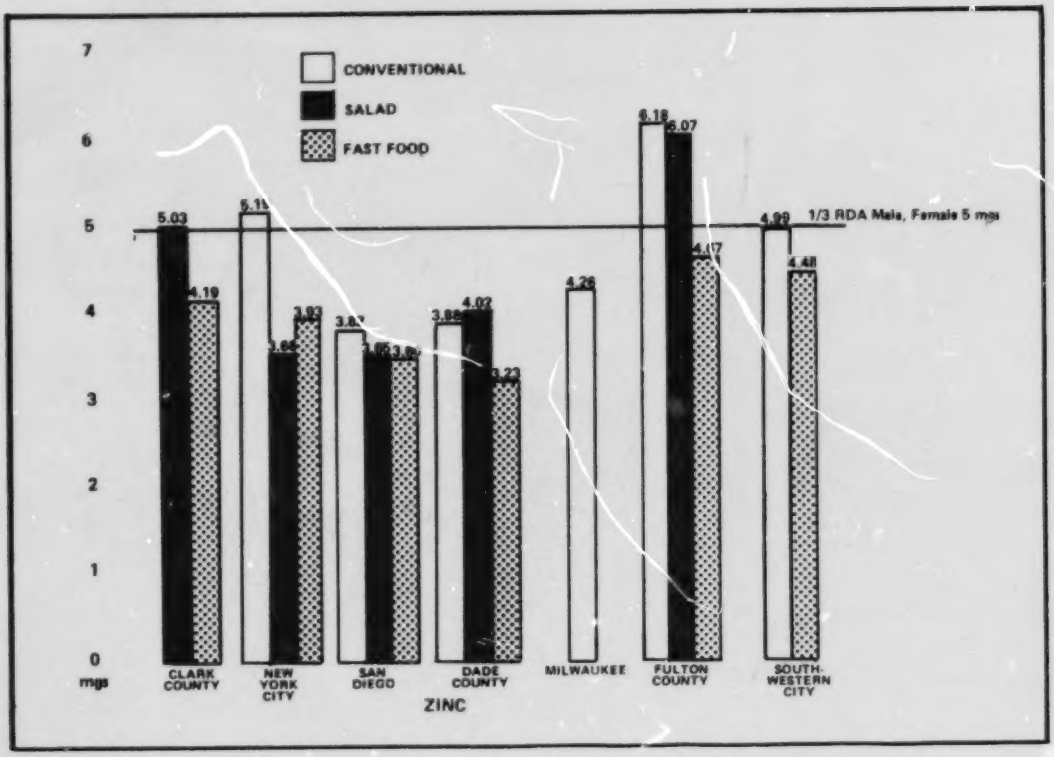


Zinc

Most districts' formats did not meet the goal for zinc. Two districts' fast-food formats and two districts' salad formats were seriously deficient--3.8 mgs or below.

Meat, liver, eggs, and seafood (particularly oysters) are good sources of zinc. Whole-grain products also contain zinc.

APPENDIX II



Vitamin C

Vitamin C (ascorbic acid) deficiencies were found in all three lunch formats but were common only in the fast-food format. Serious deficiencies--15 mgs or below--were rare except in one district where all three formats were seriously deficient.

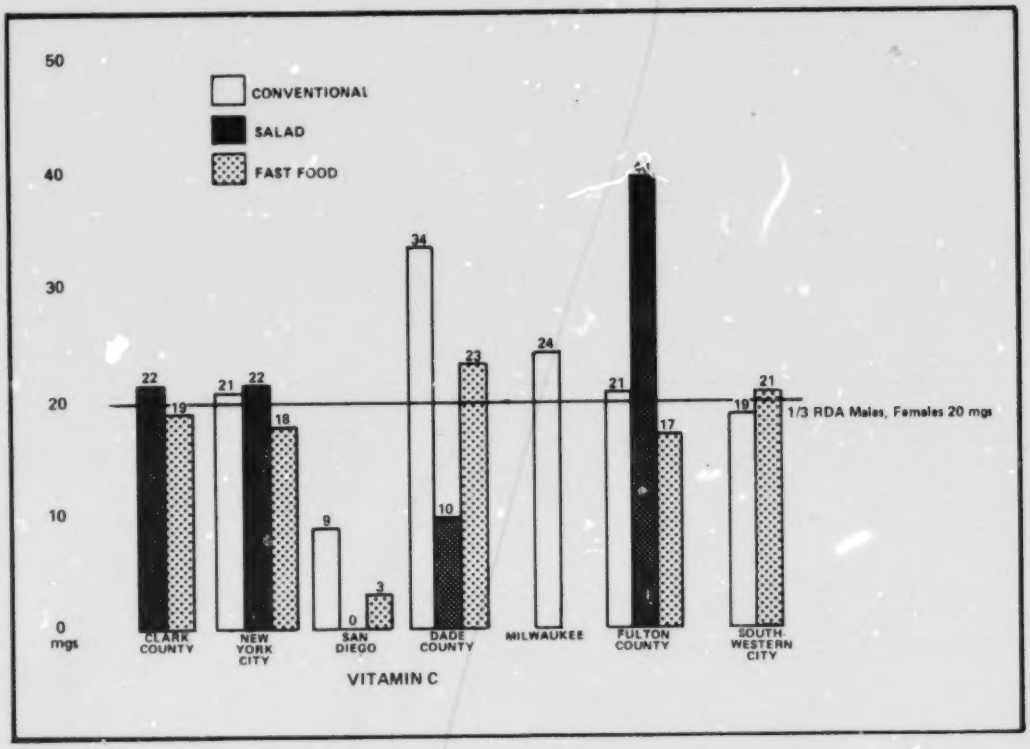
Vitamin C is found in relatively large amounts in fresh, canned, and frozen citrus fruits and is also found in tomatoes and other fruits, potatoes, and leafy vegetables. However, because vitamin C is very unstable and can even be lost through cutting and chopping foods as well as cooking and prolonged storage, great care must be taken in the storage, preparation, and serving of vitamin C food sources to preserve this nutrient.

Citrus fruits, other fruits, and vegetables were offered most often in the conventional format, although one high school in Fulton County offered oranges on its salad bar.

Clark County and New York City increased the vitamin C content of their lunches by offering vitamin C-restored french fries.

As a result, none of the Clark County fast-food lunches served with fries and milk (which contained small amounts of vitamin C) were deficient in vitamin C. In New York City, the restored french fries alone met the vitamin C goal for the entire lunch, and only those fast-food lunches served without fries were deficient in vitamin C. Fast-food lunches offered in these two districts would probably have been seriously deficient without the inclusion of these fortified french fries.

USDA's menu planning guide recommends that districts include vitamin C-rich vegetables and fruits in their lunches at least two or three times a week. The guide contains a table which lists such food and groups them by nutrient density.



Vitamin A

Meeting the vitamin A goal was generally not a problem in the conventional or salad formats. For the fast-food format, however, deficiencies were widespread and serious--1250 International Units (IU) or below for males, 1000 IU or below for females.

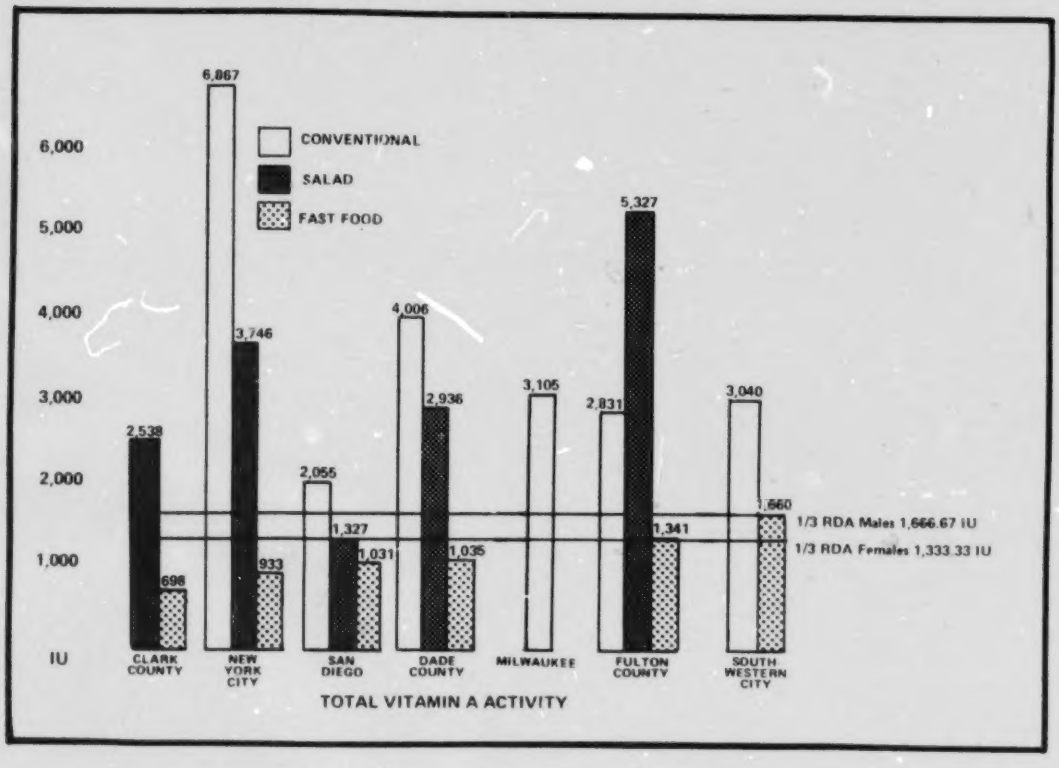
In South-Western City schools the milk alone contained enough vitamin A to meet the goals. Consequently, lunches at South-Western City which included milk met the RDA goals regardless of format. However, its fast-food lunches offered with a milkshake

did not because the dairy product used in the milkshake contained less vitamin A.

In locations that offered conventional and salad formats along with the fast-food format, the vitamin A deficiency in fast foods could be alleviated if, during the week, the students selected lunches from the conventional or salad formats as well as the fast-food format. In Dade County, for example, a student eating fast foods 3 days a week could still obtain the one-third RDA weekly goal by eating a conventional meal or salad on the other 2 days. In Clark County, however, only the salad format provided a daily amount of vitamin A sufficient to meet the goal, and it is highly unlikely that most students would eat salad exclusively during the week.

Vitamin A is found in liver, dairy products, dark-green leafy vegetables, deep yellow vegetables, and fruit. A dairy product must be offered in all formats, but vegetables and fruits are found more often in the conventional and salad formats than in the fast-food format. Consequently, the lunch format was the major factor determining whether a lunch met the goals for vitamin A.

USDA guidance recommends that districts include a vitamin A-rich vegetable or fruit in their lunches at least twice a week. The menu planning guide contains a table which lists such foods and groups them by nutrient density.

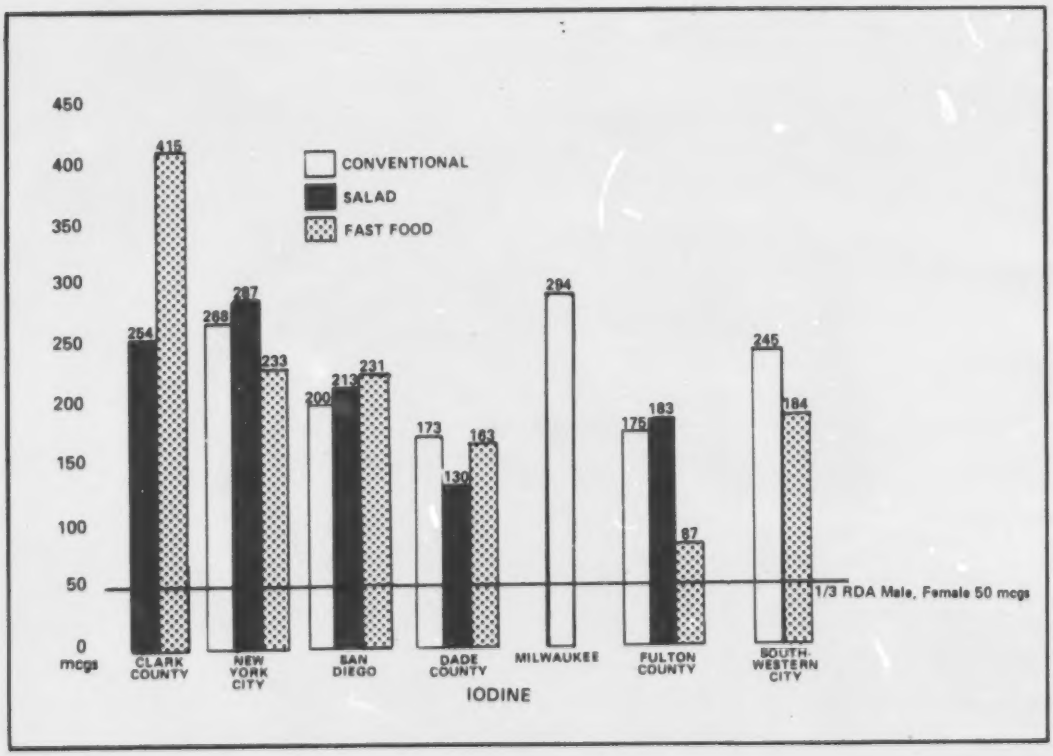


Iodine

All districts' formats contained iodine in amounts exceeding the one-third RDA goals for males and females. Most districts' formats had at least triple the iodine goal, and one district's fast-food format had over eight times the goal. No pattern emerged by district or format. For example, fast-food formats had both the lowest and highest levels of iodine.

The National Academy of Sciences in its 1980 recommended dietary allowances noted that concern had been expressed about potentially excessive intake of iodine. The Academy stated that although iodine consumption in the United States has increased in recent years, no evidence has been found of increased adverse reactions, such as chronic iodine toxicity or hypersensitivity. The Academy concluded that current iodine intake by most Americans is adequate and safe but cautioned that additional increases in iodine intake should be viewed with concern.

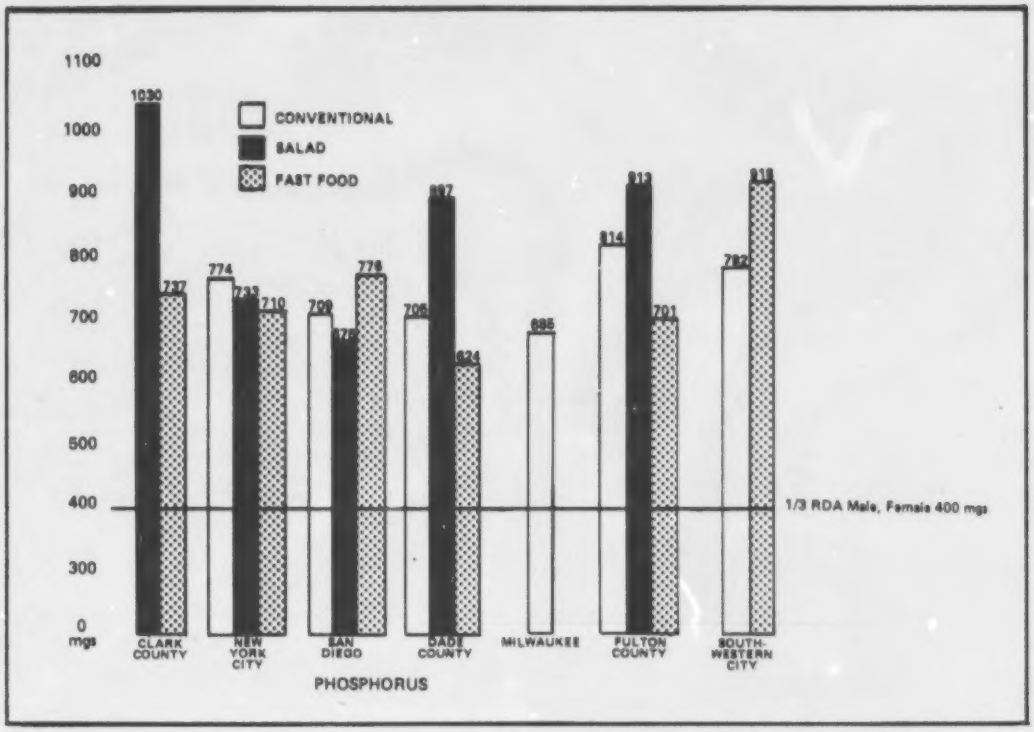
Iodine is found mainly in seafood and iodized table salt. In line with the concerns that iodine intake may reach excessive levels, USDA deleted from the 1980 menu planning guide its recommendation that iodized salt be used in preparing lunches.



Phosphorus

Phosphorus deficiency was not a problem in the school lunch programs. All districts and formats provided enough to meet the one-third RDA goal.

Milk, meat, poultry, fish, egg yolks, legumes, and nuts are rich sources of phosphorus. These are found in sufficient quantity in all three formats.

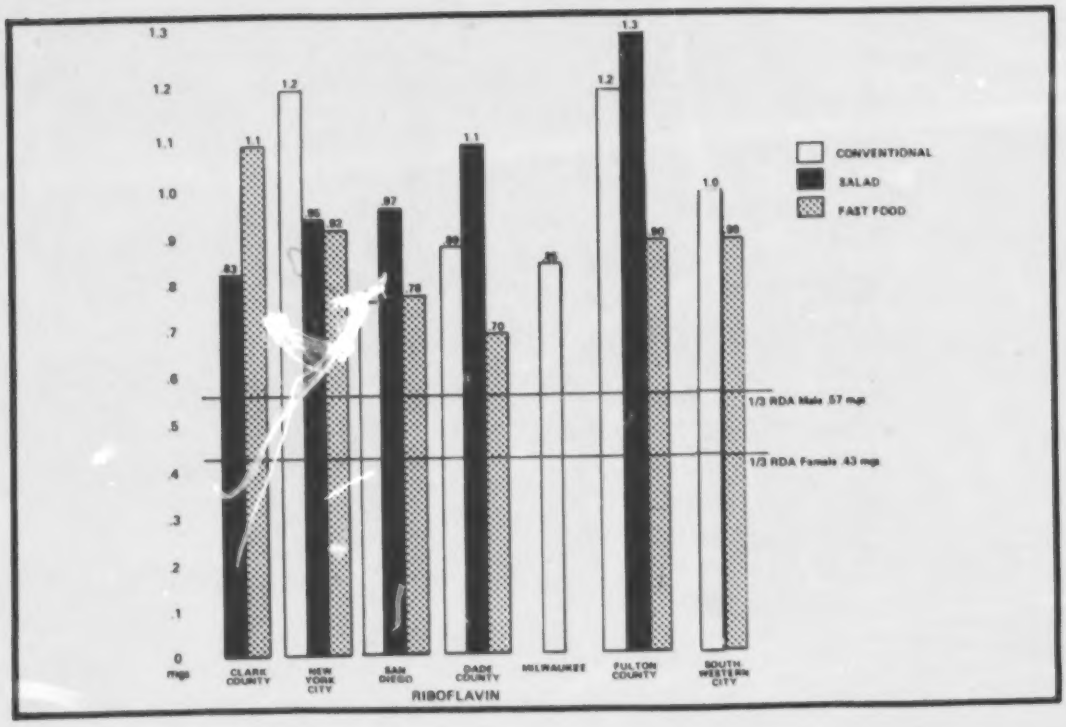


Riboflavin

All lunch formats tested in all districts provided adequate riboflavin (vitamin B-2) to meet the male and female goals.

About one-half the daily requirement of riboflavin is furnished by milk alone. Cheese is also a good source. Important but smaller contributions are made by meat, dark-green leafy vegetables, and enriched cereal foods. Since all lunch formats offer milk or milkshakes, the riboflavin goal should be met by each format.

APPENDIX II

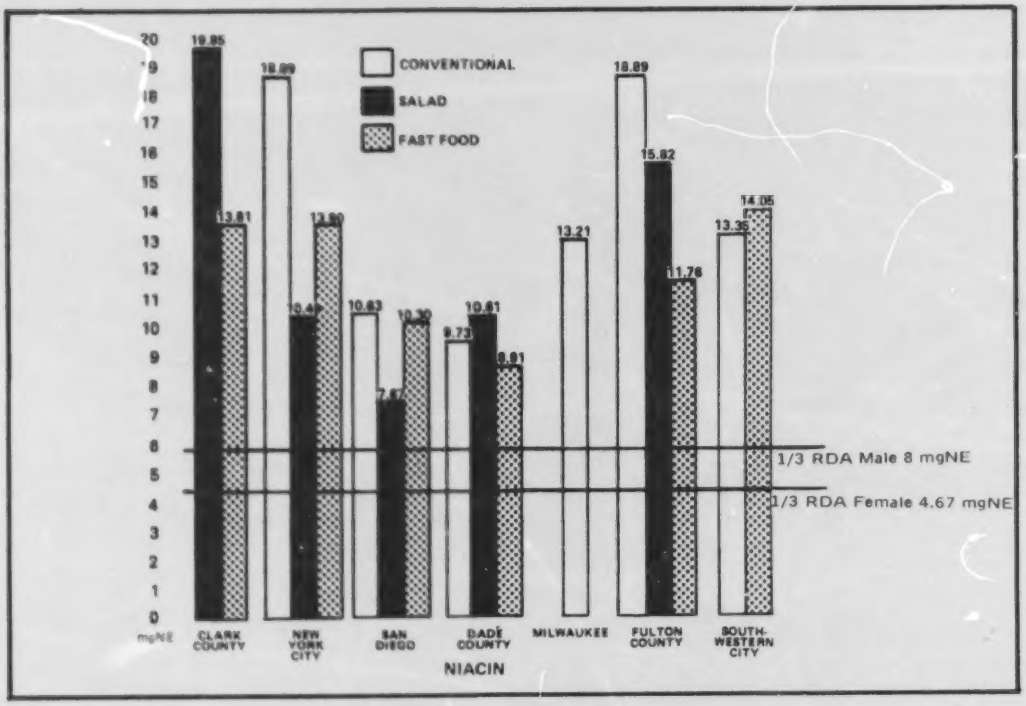


Niacin

The RDA for niacin is expressed in niacin equivalents--a mixture of niacin consumed in a preformed state and tryptophan, an amino acid which the body synthesizes into niacin. 1/ In each district, all formats tested provided enough milligrams of niacin equivalents (mgNE) to meet the one-third RDA goal for both males and females.

Meats are the chief source of preformed niacin and tryptophan. Dark-green leafy vegetables and whole-grain or enriched breads and cereals are fair sources of niacin.

1/From every 60 milligrams of tryptophan consumed, the body synthesizes 1 milligram of niacin.

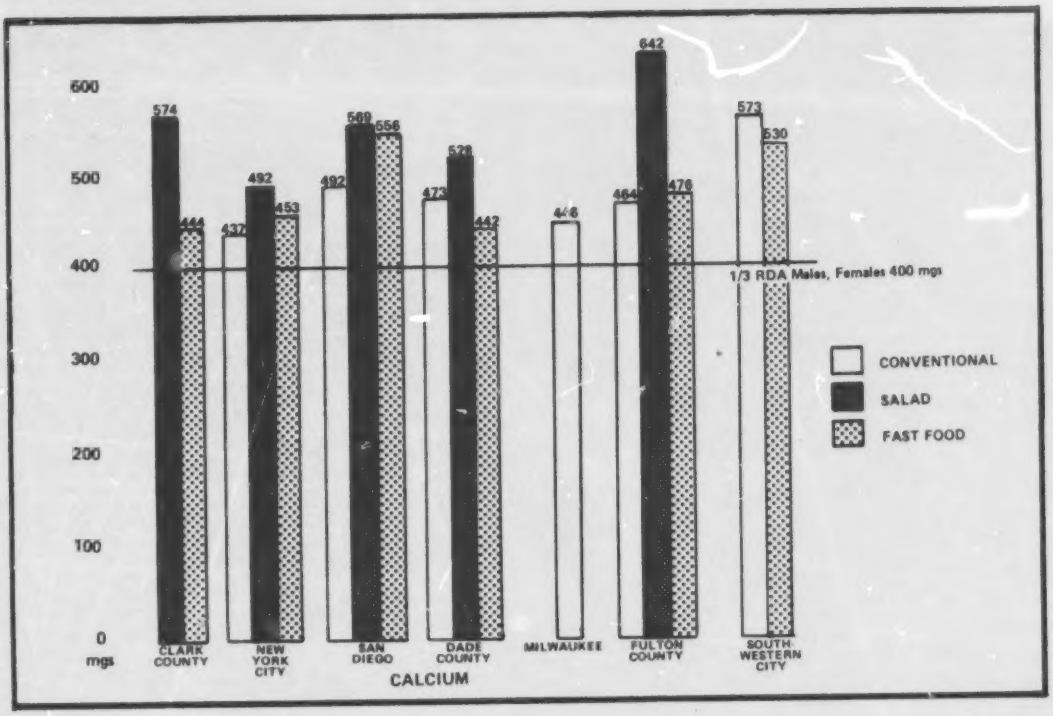


Calcium

Calcium deficiency was not a problem in any district or format. All met the goal.

Hard cheeses are excellent sources of calcium. Milk, kale, turnip and mustard greens, and collards are good sources of calcium. Broccoli, cabbage, cauliflower, beans, and peas are fair sources.

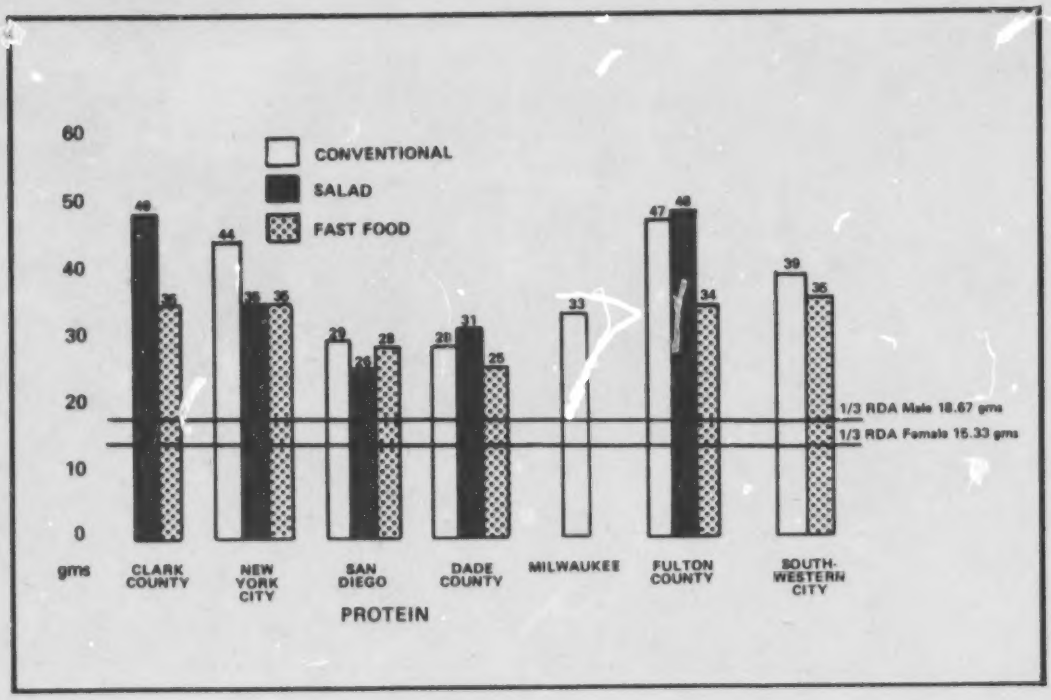
APPENDIX II



Protein

In each district all formats tested provided enough grams (gms) of protein to meet the male and female protein goals.

Meat, fish, poultry, eggs, and dairy products (such as milk, cheese, yogurt) are rich sources of protein. Vegetables, grains, and legumes are also sources of protein. The meal pattern requires that each lunch regardless of format contain at least 2 ounces of meat or other protein-rich food. Apparently, this is enough to meet the protein goal.



NUTRIENTS WITH NO SPECIFIC RDAs

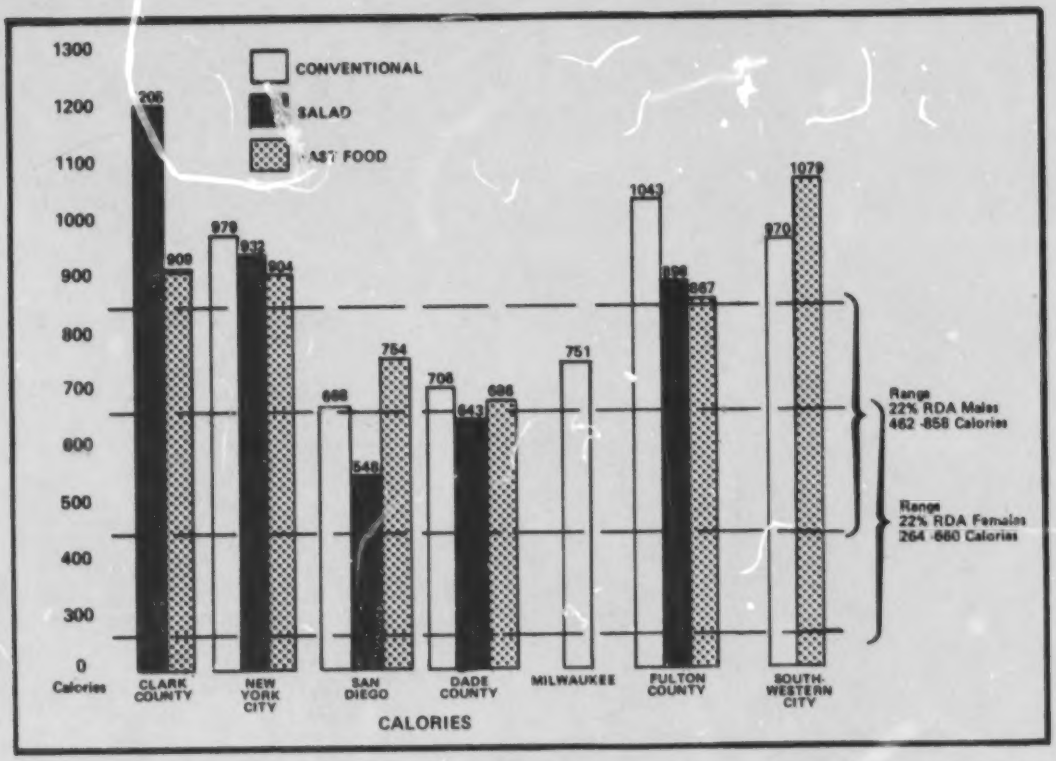
In addition to the 14 nutrients for which specific RDAs have been established, we tested for calories, cholesterol, sodium, and total sugar. The Academy did not establish specific 1980 RDAs for these nutrients although it set ranges for calories and sodium. The following paragraphs convey our findings.

Calories

All districts' formats provided calories exceeding the lower limits established for males and females. However, most formats in the districts contained calories exceeding the upper limits. Because energy needs are based primarily on body size and level of physical activity, the significance of lunches containing calories exceeding the established range is unknown.

A calorie is a unit of heat used to measure food energy content. Before 1980, the Academy had not established a specific RDA for calories. The school lunch meal pattern as designed should provide 22 percent of the pre-1980 RDA for calories rather than the one-third RDA goal for other nutrients. USDA believed that

children were obtaining more than two-thirds of the calorie requirement from the other two meals and between-meal snacks and therefore needed fewer calories from lunch.



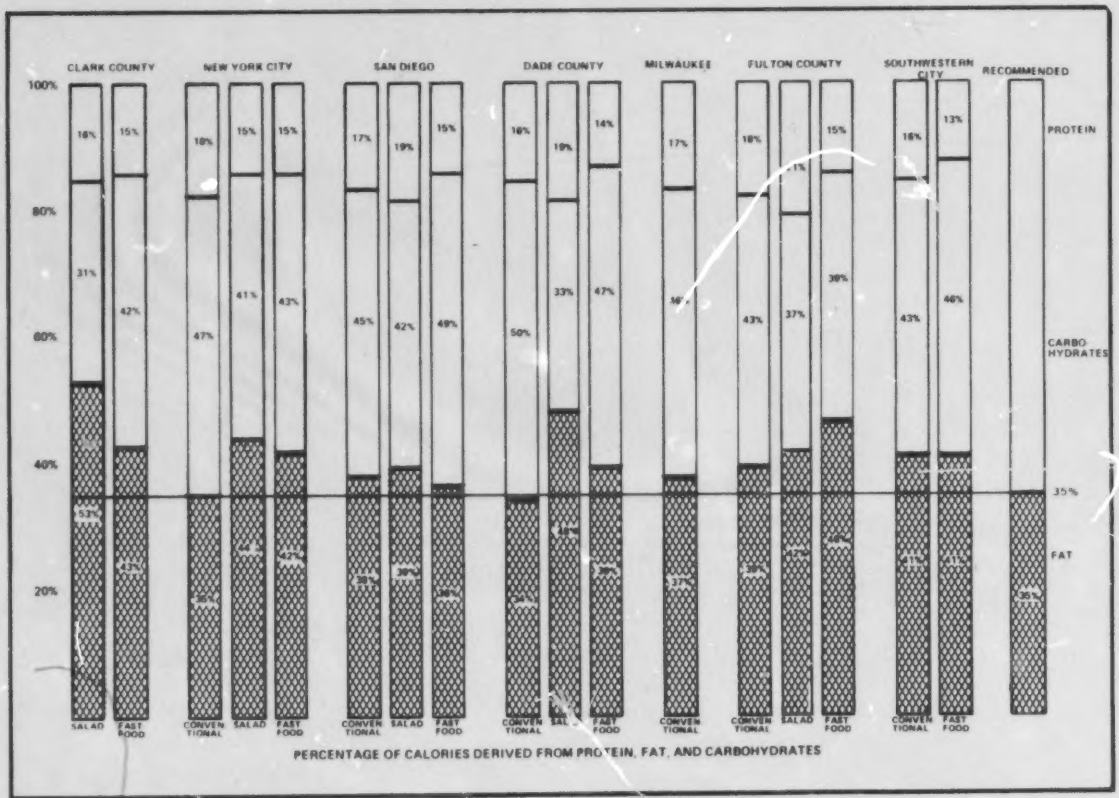
There is no unanimity among nutritionists concerning levels of calories which should be derived from the three energy-producing nutrients (carbohydrates, protein, and fat). In 1977 the former Senate Select Committee on Nutrition and Human Needs recommended that Americans decrease overall fat consumption until only 30 percent of calories come from fat and increase the consumption of carbohydrates so that 58 percent of calories come from carbohydrates--48 percent of calories to be derived from complex carbohydrates and natural sugars and 10 percent from processed and refined sugars. These recommendations leave 12 percent of calories to be derived from protein.

In 1980 the National Academy of Sciences recommended that fat provide no more than 35 percent of caloric intake. The Academy has established no standards for the amount of calories to be provided by carbohydrates and protein.

USDA officials we interviewed agree with the Academy's recommendation on fat intake. In the school lunch menu planning guide, USDA recommends that districts limit the amount of fat contained in the meals and provides guidance on limiting fat.

In line with this recommendation, USDA has reduced the level of allowable fat in ground beef it donates to the school lunch program. Also, to make lunches available containing a lower level of fat, USDA regulations require that unflavored fluid lowfat milk, skim milk, or buttermilk must be available to students. This change was effective in August 1978.

As shown below, only Dade County's and New York City's conventional formats were at or below the Academy's recommended maximum fat intake. The salad format on the average provided the largest proportion of calories from fat. This may be due to the high fat content of salad dressings. The conventional format provided the smallest.



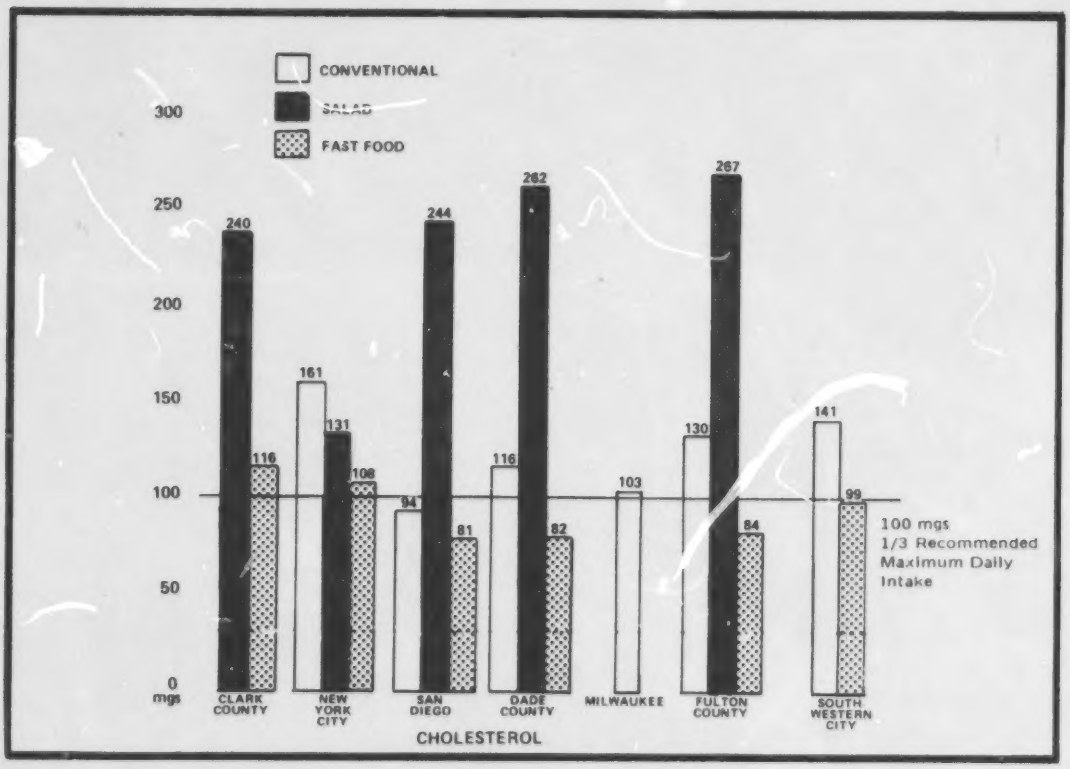
Cholesterol

Although the Academy has not established a specific RDA level for cholesterol intake, we tested lunches to determine how many contained more than 100 milligrams of cholesterol (one-third of the maximum intake recommended by nutrition authorities cited in the report by the former Senate Select Committee on Nutrition and Human Needs). With only one exception, all

conventional and salad formats exceeded the 100 milligram level. Two districts' fast-food formats also exceeded it.

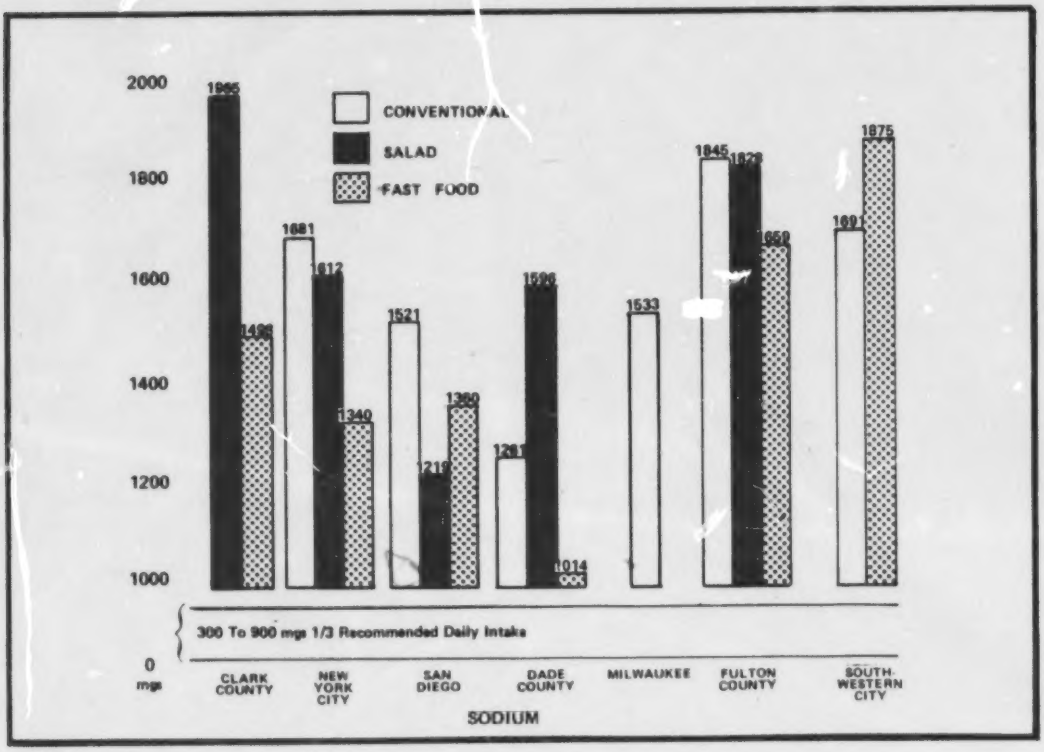
Cholesterol--a white, fatty, crystalline form of alcohol--is a normal constituent of our body tissues and is particularly important in the formation of brain and nervous system tissues. Generally, the body manufactures enough cholesterol to meet its needs from fats, carbohydrates, and amino acids. Egg yolks and liver contain large amounts of cholesterol. Cholesterol is also found in varying amounts in dairy products, fatty meats, poultry, and seafood.

Currently much controversy surrounds the health implications of dietary intake of cholesterol. For the past several years, nutrition authorities recommended that daily cholesterol intake be limited to not more than 300 milligrams to reduce the health risks associated with high cholesterol levels in the body. On the other hand, the National Academy of Sciences in its recent report "Toward Healthful Diets" stated that no significant correlation between cholesterol intake and cholesterol levels in the body had been shown in the U.S. population. The report also noted that people absorb dietary cholesterol poorly and the rate of absorption decreases as cholesterol intake increases. Consequently, the Academy's Food and Nutrition Board has made no specific recommendations about dietary cholesterol levels for healthy persons.



Sodium

Sodium deficiency was not a problem with the school lunches tested. However all districts' formats exceeded the range of recommended dietary intakes established by the National Academy of Sciences for adolescent males and females. Excessive sodium may pose a problem. Nearly all formats contained at least twice the mean recommended amount; a few contained over three times the mean recommended amount.



Salt and salty foods are the major sources of sodium in the diet, and its intake is governed more by taste and habit than by need. In fact, a typical American diet based on the four food groups 1/ would provide enough sodium to meet the RDA goals even if no salt or other sodium-containing compound were added.

1/USDA defines the four food groups as (1) meats, (2) vegetables and fruits, (3) breads and cereals, and (4) milk foods.

Excess sodium in the diet is believed to contribute to high blood pressure, particularly among people susceptible for genetic reasons. Therefore, USDA recommends that districts limit the amount of sodium in their meals. In line with this recommendation, USDA's menu planning guide suggests ways to limit salt intake in menu planning, food purchasing, recipe modification, and food production techniques. It also lists sodium compounds used in food preparation and foods containing relatively high levels of salt.

USDA is now donating roasted unsalted peanuts to the school feeding programs. It is also studying reducing salt levels in the canned vegetables it donates to help limit salt in school lunches.

Total sugar

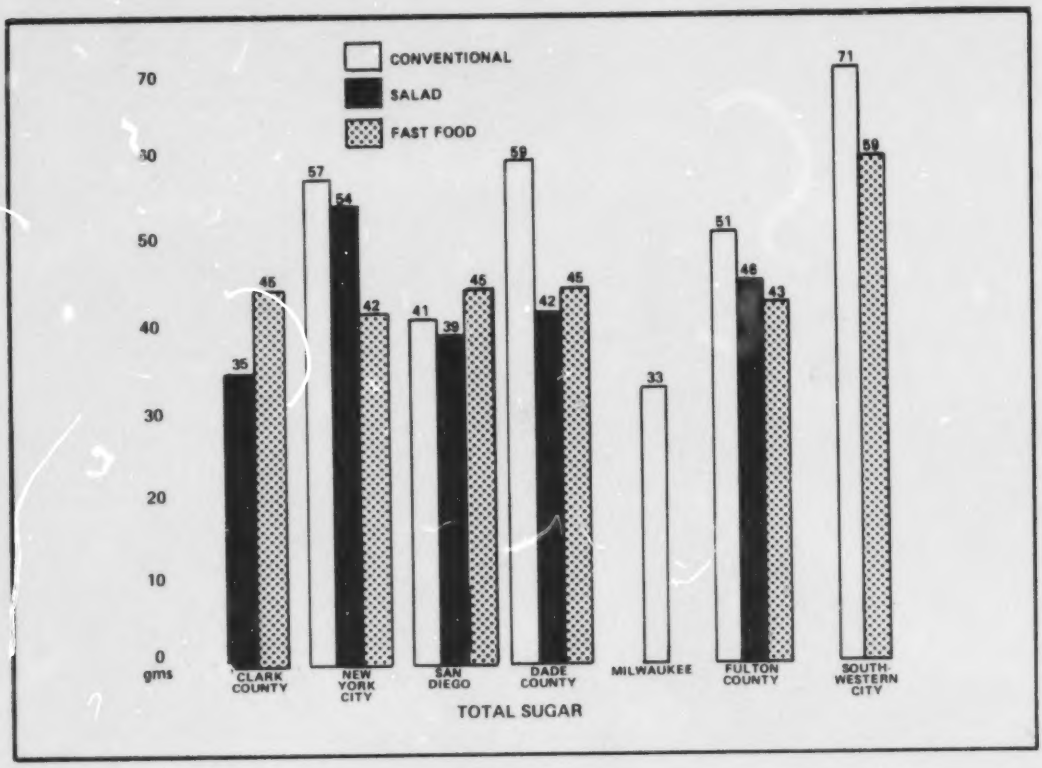
The Academy established no RDA for total sugar. 1/ Many nutritionists feel that Americans consume too much sugar, but no one has scientifically determined how much is too much. USDA recommends that districts take steps to limit the amount of sugar in school meals.

Total sugar content in the school lunches varied both by district and format. South-Western City's lunches had by far the highest sugar content, followed by New York City, Dade County, and Fulton County. Milwaukee's conventional format had the lowest total sugar content.

Among the three formats, the conventional lunch generally contained higher total sugar levels than the fast-food or salad formats. One possible reason is that fresh fruits and desserts--generally high in sugar content--were offered more often with the conventional format than the others.

1/Total sugar content includes glucose (dextrose), fructose, sucrose, lactose, and maltose.

APPENDIX II



The five school districts that offered milkshakes could reduce total sugar content dramatically if they discontinued this option. For example, New York City's milkshake contained over 48 more grams of sugar than its serving of milk, and South-Western City's milkshake contained over 39 more grams of sugar than its milk. However, our analysis showed that milkshakes were more nutritious than milk for certain other nutrients. Districts should therefore consider the impact on other nutrients before eliminating milkshakes to reduce sugar.

USDA's menu planning guide recommends that schools moderate the level of sugar by limiting (1) the frequency that foods rich in sugar are served and (2) the quantities of such foods or items containing sugar used in food preparation. The guide provides lists of the various types of sugar or sweeteners and foods containing high levels of sugar.

USDA took steps to reduce the sugar level in various donated commodities. It specifies that canned fruits be packed in light syrup or natural juice and that juices (mostly citrus) have no sugar added. Catsup and canned sweet potatoes also have less sugar now.

OVERVIEW OF SCHOOL DISTRICTS SELECTED FOR REVIEW

CLARK COUNTY SCHOOL DISTRICT, NEVADA

Clark County, encompassing the greater Las Vegas area, serves about 41,000 lunches daily to students from 103 schools. Before 1973 the school lunch program consisted of a conventional Type A lunch or a la carte sandwiches. Participation by high school students was poor. Beginning in 1973 a new food service director decided to capitalize on the success of fast-food chains and began introducing fast-food "combos" into the high school lunch program. These combos--consisting of a hot or cold sandwich, french fries or salad, and 2-percent milk or a milkshake--were designed to meet the meal-pattern requirements and still resemble the food offered by the off-campus fast-food competition.

Atmosphere

Senior high school lunch periods range from 30 to 45 minutes with most being 35 minutes long. Cafeteria managers try not to keep students standing in line more than 5 to 7 minutes. The length of the lunch periods at the schools visited seemed adequate.

Students eat at round tables that seat six to eight or eat outside at picnic tables or on the lawn. Some high schools have outdoor serving windows to serve students eating outside. Las Vegas weather is warm enough to permit year-round outside dining.

Menu development and food choices

Combo menus are developed to compete with nearby fast-food chains. Items are kept on the menu or dropped depending on student demand. The two least popular items are replaced with alternate entrees the following year, except for those combos retained because they are made with donated commodities. Direct student and parent/teacher association involvement in menu planning was described as minimal--the "free market" determines the menu.

Merchandising and marketing are integral parts of the innovative lunch program. Some of the combos were given catchy names (such as Big Tex'n, Big Virginian, Big Nevad'n) to promote them. Posters advertising the milkshakes and combos are displayed in the cafeterias. At the time of our visit the district offered only a fast-food format with 15 combos and a salad bar option at all junior and senior high schools. In addition, a limited combo program with a choice of six combos daily was being tested at 13 elementary schools. All combos were prepared onsite and kept warm under heating lamps or warmed as necessary in microwave ovens.

Like the fast-food chain competition, hot sandwiches are served in styrofoam containers and french fries are served in small bags. Students order and are served through one of a dozen or so windows giving the impression of a fast-food restaurant. These windows were already in the cafeterias when the combo program was introduced.

Before the 1980-81 school year, the cafeterias sold a la carte carbonated beverages. In keeping with the fast-food format, the former director believed that carbonated beverages were an integral part of such meals and many students would not participate without them. Over 2 million soft drinks were sold annually. Clark County did not claim reimbursement for a la carte lunches served with soft drinks. Carbonated beverages are no longer sold with the lunches. 1/

Clark County also took steps to improve the nutritional quality of the lunch program. The food service division started serving low-fat milkshakes; low-fat, all-turkey frankfurters; french fries enriched with vitamin C; taco shells made from whole-grain cornmeal; and pizza crust containing wheat germ and lecithin but no preservatives.

Equipment needs

According to food service officials, the fast-food innovation required very little kitchen renovation in Clark County. Deep-fat fryers were purchased to cook french fries, heat lamps were purchased to keep foods hot, and microwave ovens were purchased to heat sandwiches. No other special equipment was needed.

Pricing student lunches

The Clark County pricing structure was designed to encourage students to purchase a complete reimbursable lunch. For the 1979-80 school year, high school students were charged 75 cents for a complete lunch. 2/ Prices of a la carte entrees ranged from 30 cents for a taco, a slice of pizza, or a piece of fish to 65 cents for a cheeseburger or hot ham and cheese sandwich. Most a la carte entrees cost 55 cents or 60 cents, french fries cost 30 cents, desserts cost 15 cents or 20 cents, milkshakes and soft drinks cost 25 cents, and milk cost 15 cents.

1/Effective July 1980, USDA regulations prohibit the sale of foods of minimal nutritional value, such as carbonated beverages, until the end of the last lunch period.

2/A schedule comparing lunch prices for the last 4 years in all the school districts visited is provided in app. V.

Organization and management

The Food Service Division is organized by function, with supervisors in warehousing, central kitchen, school cafeteria, and clerical operations reporting to the food service coordinator who reports to the food service director. This division is located in the district's Business and Finance Division, with the food service director reporting directly to the cognizant associate superintendent. Accommodating the former director's business background, all food-related functions (e.g., trucking, warehousing) were placed under the Food Service Division so that it could function as a business entity. The division also manages its own personnel functions. The cafeteria workers are nonunion civil servants.

In short, the Clark County program is run as a business inasmuch as

--students are considered as customers;

--off-campus restaurants are considered as competition;

--marketing is considered as essential;

--each school cafeteria receives a monthly profit and loss statement comparing revenue with food, labor, and miscellaneous costs,

--inventories are closely monitored; and

--food purchasing, transportation, and warehousing are done at the lowest possible total cost.

DADE COUNTY PUBLIC SCHOOLS, FLORIDA

Dade County has the fifth largest school district in the Nation. Its Food Service Department serves about 143,000 lunches daily to students from 247 schools.

The Dade County lunch program was considered innovative because it uses the computer assisted nutrient standard (CANS) method of menu planning and evaluation in its elementary schools, offers a wide variety of foods, and offers several lunch formats in its high schools.

Atmosphere

According to the Director of School Food Service, students generally have one hour to eat lunch, but the amount of time varies from school to school because the time is set by the school principal. At one school visited, the lunch period was 1 hour, but the serving time was only 35 minutes. At another

school, the lunch period was 30 minutes. At both schools, the students seemed to have adequate time to eat.

Student eating facilities varied considerably at the high schools. All schools had large indoor eating areas. In addition, one school sold lunches through the school's theatre ticket window and students ate on the lawn or on benches or sat informally in carpeted hallways and socialized while they ate. At another high school, a kiosk (open pavilion) was being built for outdoor patio meal service. In short, schools were allowed to improvise as far as meal service and eating facilities were concerned.

Menu development and food choices

The Dade County senior high school lunch program offers a wide variety of food choices in several formats.

NUMEROUS CHOICES OFFERED TO DADE COUNTY STUDENTS.

The Food Service Division prepares weekly suggested menus for the elementary and secondary schools, but the two senior high schools where we collected our meal samples--Miami Southridge and South Miami--did not follow these menus every day.

Both schools offered similar conventional and fast-food formats. The conventional line offered a choice of a hot entree, a hot sandwich, or a cold sandwich; two of five vegetables; bread; one of two desserts; and 2-percent white or low-fat chocolate milk. The fast-food line offered a hot sandwich (hamburger, fishburger, etc.), a potato item (such as tater tots), fruit or tossed salad, bun, and milk or milkshake. In addition, South Miami had a salad bar with extensive trimmings while Southridge offered a low-calorie plate, a prepared chef's salad, and a bag lunch. The bag lunch consisted of a sandwich (such as frankfurter, sausage, or ham and cheese); fruit and/or juice; potato chips, corn chips, or cookie; and milk. All food served in the lunch program is prepared in the cafeterias.

Nutrient-based menus

Dade County uses CANS menu planning. However, Dade County's computer program is designed so that menus produced also conform to the USDA meal pattern. According to the Director of School Food Service, this is done to protect the children because under CANS the computer is programed to design menus to provide the required levels for only nine key nutrients. Some less critical but important nutrients could be overlooked. The director believes that providing a complete meal-pattern lunch helps ensure that students receive the USDA goal of one-third of the RDAs over time.

The CANS approach is followed only in elementary schools. However, the high schools benefit from the CANS-produced standardized recipes, pre-costed menus, and yield-adjusted recipes which aid in portion control.

Dade County has several sources for student feedback. First, the county tests all new food items in 25 schools before introducing them in all schools. The students also provide informal suggestions and complaints to the cafeteria managers. The county has developed a formal mechanism for student feedback--youth advisory committees--but the Food Service Department does not currently have personnel to implement them.

Equipment needs

No unusual food preparation methods were used in the Dade County high schools. Therefore, no unusual equipment was needed. The only changes in the lunch format over the last 5 years requiring special equipment were the salad bars. Costs were incurred in constructing the food service kiosk at the one high school.

Pricing student lunches

Secondary students were charged 65 cents for a complete lunch in 1979-80. The county permits the sale of a la carte food items during the lunch period. However, in some schools the principals do not allow the sale of such items unless they are bought in conjunction with a reimbursable lunch.

Organization and management

The Food Service Department of the Dade County Public Schools is headed by the Director of School Food Service who reports to the district's Assistant Superintendent for Auxiliary Services. Organizationally the cafeteria personnel do not report to the Director of School Food Service. The cafeteria managers report to the school principal who in turn reports to an area superintendent.

According to the Assistant Superintendent for Auxiliary Services, problems exist with this chain of command. The principals directly control the cafeteria managers, but most principals allow the managers to work on their own. On the other hand, the managers receive supervision and direction from the Director of School Food Service and an area food service supervisor (who reports directly to the area superintendent and indirectly to the Director of School Food Service). Neither has direct authority over the managers, however. This situation can cause conflicts and confusion for school food service personnel, especially in scheduling lunch periods.

FULTON COUNTY SCHOOLS, GEORGIA

The Fulton County School System, serving the area of Fulton County outside the city of Atlanta, serves about 25,000 lunches daily to students from 103 schools. In September 1976, Fulton County launched its Nutra program. The aim of the Nutra approach is to serve natural foods; eliminate refined sugar, food coloring, preservatives, and additives used in cooking; and reduce the use of salt and animal fat as much as possible. This approach was instituted because the Food Services Director was concerned that children were becoming addicted to such foods as white bread, chocolate, and foods that were high in fat, sugar, and salt. The director believes this addiction occurs because the media encourages children at a very early age to eat foods not necessarily good for them. As a result, the program's main emphasis is to get kindergarten and elementary students "turned on" to a good diet.

The Nutra program is not being stressed in the high schools because the director believes that teaching good nutrition to high school students with established eating habits would be difficult. The director plans to expand the high school program

as today's elementary students reach high school and are already accustomed to Nutra cooking.

FULTON COUNTY STUDENTS ARE INTRODUCED TO SALAD BAR BEFORE ENTERING HIGH SCHOOL.

At the time of our visit, only five high schools offered Nutra-style cooking. The high schools visited offered three lunch formats--conventional, fast food, and salad. Any of these formats can qualify as a Nutra lunch if the foods offered on it are prepared naturally.

Atmosphere

High school students are allowed 30 minutes for lunch which seemed adequate. The cafeterias in the two schools visited had several round tables, but most students ate at institution-style tables. Neither school had paintings or murals on the cafeteria walls. All schools are required to have bulletin boards to display nutrition-related articles. Although one school's cafeteria had no windows, both were lighted adequately.

Menu development and food choices

Fulton County emphasizes, but does not require, Nutra cooking. Before a school is considered to be serving Nutra food, its cafeteria employees must be trained in Nutra-style food

preparation. For example, kitchen personnel are taught how to bake bread without using refined sugar and how to handle foods cooked without preservatives.

Because Nutra cooking can be a drastic change for students, various techniques are used to introduce Nutra-style foods into the lunches. For example:

--Chocolate was eliminated from the lunches and replaced with carob, a similar-tasting substitute.

--Whole-wheat pasta products are mixed with white flour products (such as spaghetti made with half whole-wheat and half white flour noodles) so the students do not notice the change.

--Some foods are mixed with or hidden in other foods (such as whole-wheat lasagna noodles covered with tomato sauce).

In addition to developing techniques to introduce the Nutra program, some food changes were made, such as

--eliminating all chocolate milk and serving 2-percent white milk and buttermilk,

--eliminating white rice and noodles and serving brown rice and whole-wheat noodles,

--eliminating bleached flour and serving whole-wheat breads,

--using wheat germ in bakery products and offering it on salads,

--offering fresh fruit with every lunch, and

--offering sprouts with the salad bars.

The lunch program at the two high schools visited consisted of three basic formats--conventional, fast-food, and salad-bar lunches. The Nutra-style conventional lunch was made from natural foods as described earlier. The fast-food format offered items such as hamburgers, frankfurters, sloppy joes, tater tots, tossed salads, fruit, cookies, and milk. Some of these items were not Nutra foods (such as hamburger buns made from bleached flour and frankfurters with preservatives). Fulton County offers desserts with each conventional and fast-food lunch served. The Nutra-style salad bar consisted of salad greens and other raw vegetables, chopped eggs, and sandwiches.

Menus in Fulton County are required to provide foods as specified in the USDA meal pattern and the more stringent State requirements. At the time of our visit, Georgia required secondary

schools to offer lunches with 3 ounces of protein and 1 cup of fruit and/or vegetable. The schools visited were also offering a double bread serving which, until recently, the State required. To avoid any confusion that might have resulted from a mid-year menu change, the cafeteria managers did not decrease the bread servings to the USDA minimum until school opened in September 1980. For the 1980-81 school year, Georgia reduced the meat/meat alternate requirement to 2 ounces and recommended a 2-1/2-ounce high school portion.

The State has traditionally prohibited local school authorities from having outside contractors process donated commodities into more readily usable forms. In 1979-80, the State made its first exception and allowed districts to use an outside processor to make mayonnaise from donated commodities. Fulton County, however, does not use any outside processors.

Each high school in Fulton County is required to organize a Student Nutrition Action Group sponsored by parents, teachers, coaches, and/or food service managers. These groups can provide feedback to the managers on menu choices and food preparation techniques. Parent interest in and support of the lunch program is encouraged by the Food Service Program's monthly newsletter, "Nutritioning Parents." The newsletter provides Nutra-style recipes, health-related articles, book reviews, and product information.

Pricing student lunches

In 1979-80, secondary students were charged 60 cents for a complete lunch. On an a la carte basis, entrees were 50 cents, fruits or vegetables were 15 cents, and desserts were 20 cents. The district has a policy whereby students cannot purchase a la carte items unless they are bought in conjunction with a reimbursable lunch. This policy, the reasonable lunch price, and the larger State-mandated portions encourage higher lunch program participation and discourage a la carte sales.

Organization and management

The Fulton County Food Service Program is located in the School System's Administrative and Business Services section and the Food Services Director reports to its associate superintendent. The cafeteria managers and employees are responsible to both the school principals and the Food Services Director. Two food service coordinators work for the director and provide supervision, technical assistance, and training to food service personnel in the schools.

MILWAUKEE PUBLIC SCHOOLS, WISCONSIN

The Milwaukee Public School system serves about 50,000 lunches daily to students from 147 schools. Milwaukee's "innovative" program started about 18 years ago--a time when the National School Lunch Program served only half the district's schools. The food service director requested and received approval from the Board of School Directors to begin onsite food preparation at all schools equipped for it. In addition, the director received the board's commitment to build onsite food preparation facilities in all new or remodeled schools. In the last 12 years, the district has opened about 90 new programs.

The district offers only one lunch format--a conventional hot lunch; a la carte items are not available. The food service director believes that the one lunch format facilitates purchasing, transportation, storage, meal preparation, and quality control.

Atmosphere

The number and length of lunch periods vary by school. Nine of the 15 high schools have three lunch periods; the others have two. The lunch periods generally last 45 minutes except for the one high school having a 24-minute lunch period. The time allotted for lunch seemed adequate at the schools visited.

The cafeterias visited had one indoor eating area. Students ate at rectangular institution-style tables. Meals were served on molded plastic cafeteria trays and students ate with metal utensils.

Menu development and food choices

One of the outstanding aspects of the Milwaukee lunch program has been the School Lunch Committee of the Inter-High Council. 1/ This student advisory group is comprised of representatives from each high school in the city. Shortly after taking control of the program, the former director took menu-planning responsibility away from the head cooks, who wanted to cook for convenience, and gave it to the School Lunch Committee to give students a voice in their lunch program. The committee, a major voice in planning district menus, meets eight times a year to participate in taste test panels, recommend new menu selections, comment on recipe standardization, and evaluate the menu cycle on the basis of student feedback. The committee is widely known

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1/School districts were not required to involve students in the lunch program until August 1979.

among the student body and has successfully lobbied for changes in the menu cycle.

Along with the single lunch format, Milwaukee uses one standard menu for all schools. The food service director believes that the cooks can prepare the tastiest meals when they can concentrate on one menu.

Placing strong emphasis on food quality, Milwaukee has

--incorporated donated whole-grain commodities in its baked goods,

--developed rigid procurement specifications for food purchased from vendors,

--rejected certain donated commodities (such as canned boned poultry) not meeting its specifications,

--actively sought to participate in the new State Advisory Council which will provide input to USDA's Food and Nutrition Service on purchases of federally donated commodities, and

--banned the sale of competitive foods (foods of minimal nutritional value, such as soda and chewing gum, sold in competition with school lunches) since 1977.

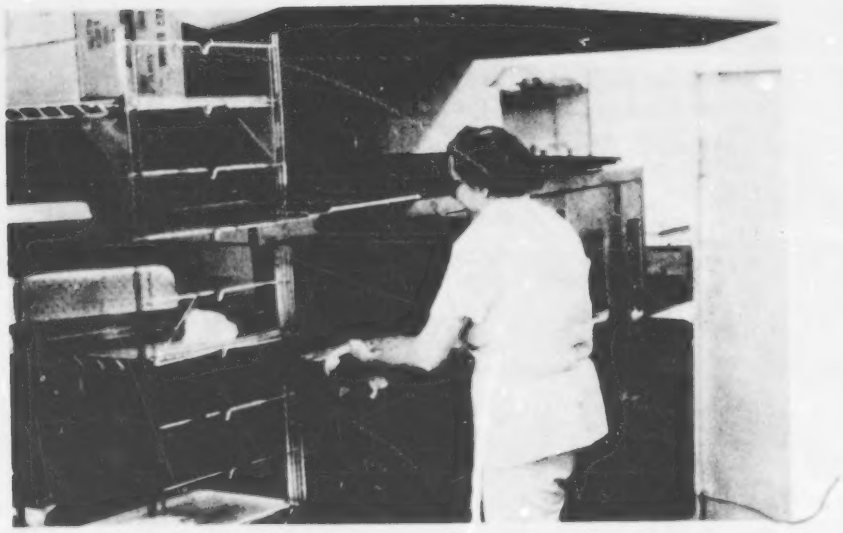
Training dietitians

Milwaukee operates the only Dietetic Internship in school food service management approved by the American Dietetic Association. Each year the Food Service Division selects interns who are in the top 2 percent of their college graduating class and trains them in school food service management. Upon successfully completing their internship and registration examination, these students are certified as registered dietitians and nearly all assume administrative positions for food service operations in school districts across the Nation.

Equipment needs

Onsite food preparation has been the cornerstone of the Milwaukee food service philosophy.

APPENDIX III



MILWAUKEE'S PROGRAM FEATURES 42 VARIETIES OF HOME-BAKED GOODS.

Food is prepared onsite at 132 of the city's 147 schools. The remaining schools are serviced by seven central kitchens, each of which prepares meals for itself and up to five other schools. All lunches are prepared from scratch in the cafeterias, including the breads, buns, and other baked items.

Because no food is sent to outside processors, Milwaukee needs some items which school districts using outside processors would not need. For example, proofers are needed to season bread dough and slicers are needed for some bakery products. Although such pieces of equipment are not unusual, they are not available in many school kitchens. Also, conveyor belts are used in some senior high schools to deliver meals to the student eating area. These belt lines, however, are not necessary for a Milwaukee-style program.

Pricing student lunches

Secondary students have been charged 45 cents for complete lunches for the last 4 school years. This was by far the least expensive charge at any of the school districts selected. No a la carte items are sold in the lunchroom.

Organization and management

The Food Service Division is part of the district's Business Department. The food service director reports directly to the district's Secretary-Business Manager. The division is divided into six functional areas--personnel management, nutrition education and the student committee, equipment and financial control, internship and internal training, menu planning and evaluation, and food and inventory control. Supervisory dietitians, who are all registered, head each area and assist cafeteria managers with problems or concerns under their jurisdiction. The cafeteria managers report to the supervisory dietitians, who report to the food service director.

The Food Service Division manages its own personnel functions and pays for the fringe benefits of its unionized employees. The division does not control major functions, such as accounting, maintenance, and transportation, but is directly charged for most of these services by the district. The division is also charged for a portion of other district costs like warehousing and handling and clerical support.

In short, Milwaukee emphasizes a wholesome, appealing, and nutritious lunch at a low price. This is achieved through menu and recipe standardization, onsite food preparation, and student input to menu development. Although not innovative in one sense, Milwaukee's program represents the archetype of a "back to basics" approach that some believe is needed in the National School Lunch Program.

NEW YORK CITY, NEW YORK

The Office of School Food Services of the Board of Education of the City of New York is responsible for overall administration and supervision of over 1,200 feeding sites operated by public and private schools in New York City. The office's budget exceeds $100 million a year, providing about 550,000 lunches on any given day.

The city's innovation is the "Energy Factory"--a new concept in school feeding designed to combine the best of several lunch formats. Two Energy Factories were operating at the time of our review--one at John Dewey High School, installed in April 1978, and one at Benjamin Franklin High School, installed in September 1978.

Energy Factories offer students a choice of foods in the following lunch formats:

--Conventional: hot entree, vegetables or fruits, bread, and milk.

--Fast food: featuring items such as hamburgers, cheeseburgers, fishburgers, pizza, fried chicken, french fries, and milkshakes.

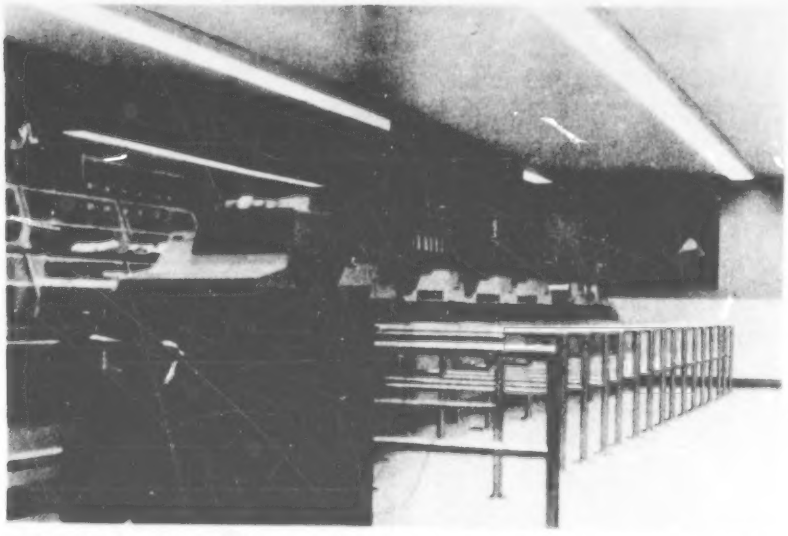
--Salad bar: cold sandwich, salad, fruit, bread, and milk or milkshakes.

Atmosphere

The length of lunch periods at the Energy Factories, generally 40 to 45 minutes, seemed adequate.

The Energy Factories were renovated with input from the student committees from Dewey and Franklin High Schools. Franklin's students helped paint the cafeteria with cheerful designs and school slogans and helped select the furnishings. Franklin's cafeteria had smoking and nonsmoking eating areas; a recreation area for ping pong, pool, and board games; and music. By comparison, Dewey's cafeteria was decorated with photo murals, smoking was prohibited, and no indoor recreation area or music was provided. Dewey students had access to a large lawn area for recreation during nice weather. Both cafeterias were well lighted and pleasant.

During the cafeterias' reconstruction, serving lines were added resembling those in fast-food restaurants. The length of



ENERGY FACTORIES RESEMBLE FAST-FOOD COMPETITION.

these serving lines is controlled by student monitors who are members of the student advisory committee. Cafeteria employees wear uniforms similar to those worn in fast-food restaurants.

Food service and school personnel stressed several spinoffs which they attribute to the Energy Factory concept. These include increased participation, reduced plate waste, improved student and employee morale, active student participation, and reduced student absenteeism.

Menu development and food choices

Student involvement in food selection and menu planning began in the early 1970's and has received increasing emphasis. All senior high schools have student committees which help plan menus, and consultative councils comprised of parents, students, faculty, and the school principal. The cafeteria manager meets with the student committee about once a month and with the consultative council about once a year.

Cafeteria managers are allowed to plan their own menus (within Federal and local requirements). This enables them to accommodate the students' racial, ethnic, or other preferences. Thus, over 1,000 lunch combinations could be served in the city on any given day.

The Energy Factories provided many choices each day with the fast-food and salad formats but little choice in the conventional format. For example, the Dewey High School salad bar typically offered meat/meat alternates, seven fruits or vegetables to complement the salad, three bread items, and milk or milkshake. The fast-food format offered seven entrees, tossed salad with choice of dressing, french fries, and milk or milkshake. In the conventional format, only one entree, two vegetables or fruits, and milk or milkshake were offered each day.

Aside from the Energy Factories, the Office of School Food Services implemented other measures to improve the lunch program citywide. It had

--required a meat/meat alternate portion of 2.2 ounces (versus USDA's 2 ounces);

--removed competitive foods from the lunchroom;

--revised procurement specifications to require less sugar and salt and to eliminate all nonbeneficial food additives, preservatives, and colorings;

--purchased more fresh fruits and vegetables;

--increased the use of whole-wheat products; and

--purchased frankfurters made from turkey and/or chicken.

It had also given high priority to phasing out meal packs (individual prepportioned lunches, generally not prepared on-site) in city schools, which was accomplished in June 1980.

Equipment needs

Installing the Energy Factories required extensive renovation of the food preparation, food service, and seating areas. The Energy Factories use grills, deep-fat fryers, heating lamps, milkshake dispensers, and salad bar tables--items not available in most of the city's elementary and junior high schools. According to food service officials, salad bars are now available at all senior high schools where students have requested them, and other cafeterias are being continuously upgraded.

Pricing student lunches

As in some of the other school districts visited, the city's pricing structure was designed to encourage students to purchase a complete reimbursable lunch. For example, whereas an a la carte cheeseburger was 95 cents and fried chicken was $1.25, a complete lunch from any of the three lunch formats was available for 75 cents. Besides fast-food entrees, many dessert items were available a la carte.

Organization and management

The Office of School Food Services, a bureau within New York City's Board of Education, is headed by the chief administrator. The office is arranged by function, such as comptroller, field services, procurement, food technology, and quality control. Each cafeteria manager is responsible to a field supervisor who reports to a field service coordinator. The coordinator reports to a field service director who, in turn, reports to the chief administrator. The office has over 10,000 employees belonging to 13 labor unions.

SAN DIEGO UNIFIED SCHOOL DISTRICT, CALIFORNIA

The San Diego School Unified District serves about 45,000 lunches daily to students from 169 schools. At one time, the San Diego Unified School District, serving the greater San Diego area, had a lunch program consisting only of a conventional Type A lunch with poor acceptance by secondary school students. Recognizing that the program needed a fresh approach, the food service director introduced a new business and marketing strategy for the secondary schools. In September 1977 the director

--redefined students as customers;

--named the conventional meal the "campus special";

--introduced a "combo" meal to appeal to the students' desire for fast food;

--placed eye-catching posters in the cafeterias to promote the new approach; and

--printed cups, plates, and other paper products with special logos.

Atmosphere

The senior high cafeterias generally have two serving/eating areas. Campus specials are served and eaten indoors, whereas combos are served at outside windows and eaten either outdoors or indoors. The climate is warm enough to enable students to eat outdoors all year. In fact, the newest high schools have only outdoor eating areas.

The number and length of lunch periods is determined by the school principal. Ten of the 14 high schools had only one lunch period which varied from 25 to 45 minutes. The length of the lunch periods seemed adequate.

Menu development and food choices

San Diego's elementary schools have a system-wide menu; its secondary schools do not. Cafeteria managers are free to plan their own menus within established food, labor, and facility constraints.

Campus-special menus for secondary schools are developed using standardized menus and considering how commodities can best be used to satisfy student preferences and the meal-pattern requirements. Combo menus, which also comply with the meal pattern, are devised to compete with fast-food restaurant offerings.

Each high school has a youth advisory committee that is involved with menu planning and food selection. The director estimated that at least half the new food items introduced into the program are tested by students. After the students taste and rate the food, the department tries to order the highest rated product if the cost is not excessive.

Each committee meets monthly to suggest recipe and menu changes and generally give the cafeteria managers student feedback. Some advisory committees reportedly were stronger than others. At one school visited, very few students interviewed were aware of the youth advisory committee.

Food choices varied among the senior high schools. Some schools offered two campus specials and up to eight combos daily, while others offered one combo daily and no campus special. Generally, senior high schools offered one campus special and two or three combos daily. In addition, every high school offered a wide variety of a la carte items daily. According to food service officials, a salad bar was tried in senior high schools but was discontinued because students and faculty abused the self-service privilege. At the time of our review, soft drinks were sold at one senior high and several junior high schools.

Nutrient-based menus

CANS menu planning is used in 113 of San Diego's elementary schools. Another 16 elementary schools use meal-pattern menus for comparison purposes. San Diego received a waiver from USDA so that the district's menus are not required to conform to the meal pattern. Although the CANS system is used only for selected elementary schools, the director said that the high schools have realized some of the menu planning, nutrient analysis, and meal costing benefits of CANS.

Pricing student lunches

San Diego charged 75 cents for a complete reimbursable lunch. A la carte sandwiches were priced from 35 cents for a frankfurter to 65 cents for a ham or submarine sandwich. Milk was 10 cents and orange or fruit juices were 20 cents. Ice cream and other miscellaneous items were priced from 10 cents to 40 cents.

Organization and management

The Food Service Department is located in the district's Business Services Division. The food service director reports to the Deputy Superintendent for Administration. The department is divided into the food management, labor management, and financial management sections. Section supervisors are responsible for all functions within their sections and assist cafeteria managers with problems under their jurisdiction. The supervisors, like the cafeteria managers, report to the food service director. The financial supervisor also reports to the district controller under a dual line of authority arrangement.

The Food Service Department is virtually self-contained, handling its own warehousing, transportation, and maintenance. The department also manages its own personnel functions, including hiring, and pays the fringe benefits of its employees. By State law, all employees must be represented by a union, but each employee does not have to be a union member. Nevertheless, all cafeteria workers are paid union-scale wages.

APPENDIX III

The Department prepares a monthly profit and loss statement showing food, labor, supply, and personnel costs for each preparatory kitchen and for the district as a whole. The reports, for management use only and not distributed among the cafeteria managers, indicate which kitchens are the most efficient.

SOUTH-WESTERN CITY SCHOOL DISTRICT, OHIO

South-Western City School District, headquartered in Grove City, Ohio, serves about 9,000 lunches daily to students from 27 schools. South-Western City managed its own food service division before 1978. Schools served a conventional Type A lunch with no menu choices. Both students and teachers were dissatisfied with the limited variety in the lunch program. Also, the food service division was losing money.

In 1978, to revitalize the lunch program and guarantee the district a financial profit from food service operations, the district hired a food service management company. The company abolished the one-format policy in the middle and high schools and introduced two lunch lines--conventional and fast food.

Atmosphere

High school students are allowed 30 minutes for lunch which appeared adequate. Students eat in carpeted cafeterias at round tables seating six to eight students.

SOUTH WESTERN CITY SCHOOL FEATURES MULTI-LEVEL DINING AREA.

Menu development and food choices

The management company tries to plan all entrees and other menu items around federally donated commodities. Foods that are not donated are purchased through the company's commissary or through local purveyors. Except at one technical/vocational school, all high school lunches are prepared onsite. Rolls and some other bakery items are prepared in the cafeterias. Commodity-processing contracts are used only for bread, pizza, and cheese.

In addition to commodity availability, the management company also considers food cost, variety, student participation, plate waste, and portion requirements in its menu planning. The company uses USDA-provided menus and recipes in addition to menus and recipes it has used successfully in other school districts it manages in the area. Taste test panels are infrequently used to select menu items because the manager believes that participation and plate waste are the best indicators of student preferences.

As mentioned earlier, South-Western City's high schools now offer a conventional and a fast-food format. On a daily basis, students can now select from two conventional entrees, three or more sandwiches, five to seven fruits and vegetables, white or chocolate 2-percent milk, and vanilla or chocolate milkshakes.

Pricing student menus

In the 1979-1980 school year, secondary students were charged 65 cents for a complete reimbursable lunch. A la carte entree prices ranged from 40 cents for a frankfurter, taco, or grilled cheese sandwich to 70 cents for a ham or roast beef sandwich. Most a la carte entrees were 50 cents, side dishes and desserts were 30 cents to 35 cents, and milk was 15 cents. This pricing structure encourages a greater reimbursable-lunch participation.

Organization and management

The food service management company kept the food service organization it inherited virtually intact. The company hires and pays its own food service director and an assistant director who handle all administrative and functional tasks of the food service division. The director reports directly to the district's Administrative Assistant to the Superintendent. All other food service personnel were kept on board. Food service personnel, including cooks and secretaries, report to the director but are hired and paid by the school district according to civil service laws. The company's contract with the district authorizes it to interview and recommend job applicants, but for the most part, the district retains control over all personnel actions.

The company provided the school district the management expertise it lacked. Since the management company took over

--inventories are monitored closely, shifted from school to school as needed, and worked into menus when excesses are identified;

--food costs are reduced by maximizing the use of donated commodities;

--daily site visits are made to monitor meal-pattern compliance and portion control and for quality assurance;

--labor productivity is monitored by school; and

--in-service training is held in-house for cafeteria personnel.

The expanded format and food choices introduced by the company are the key to the program's improvement.

SCHOOL YEAR 1979-80 FOOD SERVICE PROFILE OF SCHOOL DISTRICTS REVIEWED

School district	Estimated average daily attendance	Schools in district (note a)	Senior high schools in district (note a)	Lunch formats available in senior high schools (note b)		
				Fast food	Conventional	Salad
Clark County, Nevada	80,000	103	11	X		X
Dade County Public, Florida	202,000	247	24	X	X	X
Fulton County, Georgia	31,000	78	c/17	X	X	X
Milwaukee Public, Wisconsin	79,000	147	15		X	
New York City, New York	822,000	1,019	d/114	X	X	X
San Diego Unified, California	110,000	169	18	X	X	X
South-Western City, Ohio	16,000	27	e/3	X	X	

a/Excludes specialty, technical/vocational, or junior/senior highs unless otherwise indicated.

b/Represents the maximum number of formats available within the school district on a daily basis.

c/High schools in Fulton County School District include grades 8 through 12. Only 5 of the 17 high schools have the Nutra program.

d/Total senior high schools in New York City public school system. At the time of our review, only two senior high schools had Energy Factories.

e/High schools in South-Western City School District include grades 9 through 12.

PRICES CHARGED TO STUDENTS IN SCHOOL DISTRICTS REVIEWED

School district	School year 1976-77	1977-78	1978-79	1979-80
Clark County, Nevada:				
Elementary	$ .50	$ .50	$ .50	$ .50
Secondary	a/.70	a/.75	a/.75	a/.75
Dade County Public, Florida:				
Elementary	.55	.55	.55	.55
Secondary	.65	.65	.65	.65
Fulton County, Georgia:				
Elementary	.40	b/.40	b/.45	.50
Secondary	.50	b/.50	b/.55	.60
Milwaukee Public, Wisconsin:				
Elementary	.40	.40	.40	.40
Secondary	.45	.45	.45	.45
New York City, New York:				
Elementary	.50	.50	.50	.60
Junior high	.50	.50	.50	.70
Senior high	.55	.55	.55	.75
San Diego Unified, California:				
Elementary	.55	.55	.55	.60
Secondary	.65	.65	.65	.75
South-Western City, Ohio:				
Elementary	.55	.55	.55	.60
Secondary	.60	.60	.60	.65

a/Secondary school students may purchase a 20-meal coupon which provides a 5-cents per meal discount.

b/This price was increased by 5 cents during the school year.

FEDERAL CONTRIBUTIONS TO THE SCHOOL LUNCH PROGRAM

	Fiscal year			
	1977 (note a)	1978	1979	1980
	(000 omitted)			
Cash payments to States	$2,310,884	$2,197,435	$2,188,533	$2,747,734
Commodity donations to States (note b)	531,300	c,d/478,551	c,d/665,981	c,d/836,798
Total	$2,842,184	$2,675,986	$2,854,514	$3,584,532

a/Includes the transition quarter.

b/Represents the total value of commodities provided to the States for school lunch and breakfast programs.

c/This figure is for the school year rather than the fiscal year.

d/Includes bonus commodities ordered which were not counted against the cents-per-lunch entitlement.

(023050)

FOOD AND NUTRITION BOARD, NATIONAL ACADEMY OF SCIENCES–NATIONAL RESEARCH COUNCIL
RECOMMENDED DAILY DIETARY ALLOWANCES,[a] Revised 1980

Designed for the maintenance of good nutrition of practically all healthy people in the U.S.A.

	Age (years)	Weight (kg)	Weight (lb)	Height (cm)	Height (in)	Protein (g)	Fat-Soluble Vitamins: Vitamin A (μg RE)[b]	Vitamin D (μg)[c]	Vitamin E (mg α-TE)[d]	Water-Soluble Vitamins: Vitamin C (mg)	Thiamin (mg)	Riboflavin (mg)	Niacin (mg NE)[e]	Vitamin B-6 (mg)	Folacin[f] (μg)	Vitamin B-12 (μg)	Minerals: Calcium (mg)	Phosphorus (mg)	Magnesium (mg)	Iron (mg)	Zinc (mg)	Iodine (μg)
Infants	0.0–0.5	6	13	60	24	kg × 2.2	420	10	3	35	0.3	0.4	6	0.3	30	0.5[g]	360	240	50	10	3	40
	0.5–1.0	9	20	71	28	kg × 2.0	400	10	4	35	0.5	0.6	8	0.6	45	1.5	540	360	70	15	5	50
Children	1–3	13	29	90	35	23	400	10	5	45	0.7	0.8	9	0.9	100	2.0	800	800	150	15	10	70
	4–6	20	44	112	44	30	500	10	6	45	0.9	1.0	11	1.3	200	2.5	800	800	200	10	10	90
	7–10	28	62	132	52	34	700	10	7	45	1.2	1.4	16	1.6	300	3.0	800	800	250	10	10	120
Males	11–14	45	99	157	62	45	1000	10	8	50	1.4	1.6	18	1.8	400	3.0	1200	1200	350	18	15	150
	15–18	66	145	176	69	56	1000	10	10	60	1.4	1.7	18	2.0	400	3.0	1200	1200	400	18	15	150
	19–22	70	154	177	70	56	1000	7.5	10	60	1.5	1.7	19	2.2	400	3.0	800	800	350	10	15	150
	23–50	70	154	178	70	56	1000	5	10	60	1.4	1.6	18	2.2	400	3.0	800	800	350	10	15	150
	51+	70	154	178	70	56	1000	5	10	60	1.2	1.4	16	2.2	400	3.0	800	800	350	10	15	150
Females	11–14	46	101	157	62	46	800	10	8	50	1.1	1.3	15	1.8	400	3.0	1200	1200	300	18	15	150
	15–18	55	120	163	64	46	800	10	8	60	1.1	1.3	14	2.0	400	3.0	1200	1200	300	18	15	150
	19–22	55	120	163	64	44	800	7.5	8	60	1.1	1.3	14	2.0	400	3.0	800	800	300	18	15	150
	23–50	55	120	163	64	44	800	5	8	60	1.0	1.2	13	2.0	400	3.0	800	800	300	18	15	150
	51+	55	120	163	64	44	800	5	8	60	1.0	1.2	13	2.0	400	3.0	800	800	300	10	15	150
Pregnant						+30	+200	+5	+2	+20	+0.4	+0.3	+2	+0.6	+400	+1.0	+400	+400	+150	h	+5	+25
Lactating						+20	+400	+5	+3	+40	+0.5	+0.5	+5	+0.5	+100	+1.0	+400	+400	+150	h	+10	+50

[a] The allowances are intended to provide for individual variations among most normal persons as they live in the United States under usual environmental stresses. Diets should be based on a variety of common foods in order to provide other nutrients for which human requirements have been less well defined. See text for detailed discussion of allowances and of nutrients not tabulated. See Table 1 (p. 20) for weights and heights by individual year of age. See Table 3 (p. 23) for suggested average energy intakes.

[b] Retinol equivalents. 1 retinol equivalent = 1 μg retinol or 6 μg β carotene. See text for calculation of vitamin A activity of diets as retinol equivalents.

[c] As cholecalciferol. 10 μg cholecalciferol = 400 IU of vitamin D.

[d] α-tocopherol equivalents. 1 mg *d*-α tocopherol = 1 α-TE. See text for variation in allowances and calculation of vitamin E activity of the diet as α-tocopherol equivalents.

[e] 1 NE (niacin equivalent) is equal to 1 mg of niacin or 60 mg of dietary tryptophan.

[f] The folacin allowances refer to dietary sources as determined by *Lactobacillus casei* assay after treatment with enzymes (conjugases) to make polyglutamyl forms of the vitamin available to the test organism.

[g] The recommended dietary allowance for vitamin B-12 in infants is based on average concentration of the vitamin in human milk. The allowances after weaning are based on energy intake (as recommended by the American Academy of Pediatrics) and consideration of other factors, such as intestinal absorption; see text.

[h] The increased requirement during pregnancy cannot be met by the iron content of habitual American diets nor by the existing iron stores of many women; therefore the use of 30–60 mg of supplemental iron is recommended. Iron needs during lactation are not substantially different from those of nonpregnant women, but continued supplementation of the mother for 2–3 months after parturition is advisable in order to replenish stores depleted by pregnancy.

APPENDIX VII